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Bovine Abortion and its Control.

NORTHERN DISCUSSION ON CAPTAIN EDWARDS' PAPER.

In accordance with the arrangement made at the Chester meeting of the N.V.M.A., Captain J. P. Edwards, prior to his departure for India, visited a number of the principal branches upon the occasion of their discussion of his paper on "Bovine Abortion and its Control."

At the meeting of the Northern branch, held at Manchester, on October 4th, Captain EDWARDS prefaced the discussion with the following reference to his paper:—

Mr. President and Gentlemen,—Just at the present moment I do not propose to take up the time of the meeting, except by saying a few words by way of introduction. In the paper prepared for the annual meeting of the National Veterinary Medical Association, I endeavoured to present as briefly as and faithfully as possible what is now actually known with regard to abortion, and particularly with regard to the common form, or contagious abortion, the disease caused by a specific bacillus. There is no need to attract your attention towards the importance of this disease. As mentioned in the paper, it is now probably the most important disease of stock in civilised countries. In the paper I have been forced to employ a number of technical terms, although I have tried as far as possible to rid it of all technicalities, but these terms must necessarily be introduced, and also I have been reproached for not stating briefly what is my main theme in the course of this paper.

Well, my main theme is this, that there is no royal road towards the eradication of contagious abortion from our herds. There is no cure, nor is there likely to be one, for reasons stated in the paper. Again, there is no uniformly successful and universally applicable method of preventative treatment, but each outbreak has to be treated on its own peculiar merits, having regard to what is now known with regard to the origin and the methods of spread of the disease. These points have been dealt with systematically in the paper, and during recent years considerable advances have been made in our knowledge of these important questions. Contagious abortion presents certain striking peculiarities; the only actual manifestation of disease is the act of abortion, but the absence of abortion does not necessarily signify that an animal is free from the disease. After the act of abortion, the animal may remain a carrier, and may harbour the bacillus in a virulent form for a number of years—up to seven years or even more, as has been proved in some cases.

We have now at hand an accurate method of diagnosing these carriers or potential spreaders of the disease, namely, the agglutination test, and we also now have some pretty precise knowledge as to the spread of the disease. The probable method of transmission is by ingestion, ingestion of virulent material passed by the aborting cow. Other possible means are by the bull, although there is no actual proof that this does occur; another means is by the milk. We now know that the bacillus when ingested quickly disappears from the body, and cannot be found anywhere except in two locations in the animal, namely, first in the pregnant uterus, which it invades and sets up disease in the chorion, resulting in abortion. If the uterus is not pregnant, this organ is not a satisfactory place for the bacillus, and the organisms quickly disappear from it. The other site is the udder, and its presence can be detected in the milk. It might be said that young animals sucking infected mothers would obviously become infected. Strange to say, this is not the case. Young animals, for some reason or other, possess a very high degree of immunity, so much so, that if they are fed for long periods on naturally infected milk, the infection soon disappears from their bodies, as can be seen by testing their blood at intervals. Milk, then, does not represent ordinarily an important channel or source of infection. With regard to this important question, there are three main or chief methods by means of which one can endeavour to control or eradicate this disease from our herds. Can one, by applying to this disease such measures as have been applied to foot-and-mouth disease, get rid of it in this country? The answer is decidedly in the negative, for more than one reason, the chief reason being that this disease has now established itself in our herds to an extent which was not thought of when it was first studied in this country.

The Departmental Committee on Epizootic Abortion formulated certain strict legislative measures for the control of this infection, but we now know that this disease is prevalent to such an extent that the application of those measures would involve undue hardship upon the cattle owner. Secondly, State control can only be partial, for this reason: in order to detect all infected animals, it would be necessary to apply to all of them the agglutination test, in order to make sure that they are not infected. The absence of the mere act of abortion does not

signify that the animal is free from disease, therefore, in order to apply quarantine measures, herds would have to be tested and quarantine measures applied and maintained until tests failed to reveal the presence of the infection. Such legislative measures, however, as are denoted in the recently issued Epizootic Abortion Order are undoubtedly of great value, for the reason that the chief method of spread, and the most dangerous method, is undoubtedly by means of the sale of the recently aborted animal. For a period extending up to a couple of months after the act of abortion, the discharges that come away from the infected cow are extremely virulent. There is no doubt that the contamination of pastures with these discharges constitutes the most dangerous form of infection. If, therefore, a cattle owner is prevented for this period from foolishly disposing of his animal, and thus introducing infection to what may be a healthy herd, a great advance towards the control of this disease will have been made, but it is a partial measure.

The Limitations of Vaccination.

There is no doubt that vaccination of cattle with living organisms prevents or protects them against subsequent abortion in the large majority of cases. Statistics show that the number of cases is reduced to one-fourth or one-fifth as the result of the application of this measure, and hitherto it has been recommended that this vaccination should be performed on the non-pregnant animal at a period some time before service (about two months before service), for the reason that inoculation at a later period may entail some risk—inoculation may set up the disease itself.

Vaccination is not a perfect measure for controlling abortion; in fact, one might almost say that it is a measure of despair; it is a measure that should be applied when all other measures fail, for the reason that one is preventing the disease by establishing it in a mild form. It is not the vaccination in the same way as vaccination against anthrax or against smallpox, where, after a certain interval, the virus disappears from the body. There is reason to believe that the vaccinated animal is only immune while the virus persists in its body.

A far more valuable method is segregation, or isolation, and it simply implies separation of the diseased animals from the healthy, under strict supervision, and this involves separate pastures, etc., and the frequent application of the test for the disease, the agglutination test.

Now the question arises in what circumstances is it worth while adopting this measure, which may at times be laborious. Certainly in the case of all valuable herds, where the disease has not spread far, isolation measures should be applied. The test should be applied to the whole of the herd, and re-acting animals isolated. But one has to remember that the calves from the diseased animals may when they grow up be regarded as healthy, because during the younger stages of their lifetime the young animals appear to be immune. Again, in any herd that is kept under close observation, this method can be applied, if what now seems to be a golden rule in treating contagious abortion is adhered to, namely, to regard every case as contagious abortion until the contrary is proved. All cases directly they occur should be separated and tested, but they should not be allowed to mix with the healthy cows until they have been definitely proved to be accidental cases. Then again, in building up a herd of valuable cattle in particular, this test can be applied in order to maintain the herd clean. All animals should be purchased on a warranty that they pass this test.

Those are the main facts in the control of this disease, and I invite you to question me upon particulars, examples which have been brought to your notice in the course of your practice. I invite you strongly to press to my notice any particular problems which have presented some difficulty to you.

The Discussion.

Mr. E. H. Curbishley, M.R.C.V.S., in opening the discussion, said:—"There can be no doubt whatever of the value of the paper presented to the meeting by Professor Edwards, which gives us a good deal of food for thought for some time to come. Those of the members present who were at Chester will be aware that there was a great deal of disappointment there that it could not be discussed at that time.

"With regard to the subject itself, it is so well known that any information or investigations made at the institution from which Professor Edwards comes are known always to be so absolutely correct, it is simply a matter of accepting the facts as they are given to us. Professor Edwards says that no cure is known for the disease. I suppose we must accept it, and that the vaccination is simply to procure an immunity, while he states that about 90 per cent. of the statistical cases were certainly due to Bang's bacillus. He also mentions that contagious abortion may occur from a variety of other causes, and if those diseases only occur in 10 per cent., it may not be such a serious matter as it appears; but it would be interesting to know in how many cases such disease does occur, and whether we have the means of recognising it. We have these conditions to deal with, and at the moment they are causing a large proportion of the work that a country veterinary surgeon is called upon to do. Another point in the matter is with regard to those various other causes. I recently had occasion to send up several samples of milk, and I received a negative report. Receiving this negative evidence, the owner asked what was the position, and I told him that he could compliment himself that his cattle were not affected with Bang's bacillus, and he asked me whether there were any other causes. I told him there were other causes, to which he replied that it was not very satisfactory to him to know that there were other forms of the disease. He did not seem to be very interested, but wanted to know if the veterinary profession knew anything about abortion. I informed him that I had told him all I knew, and there it was left. He

said if they can have a vaccine for one disease why cannot they have it for all? Since that time other parturient troubles have occurred in the herd.

"Referring to carriers, the milk, particularly of carriers, is a matter that calls for a good deal of attention in the field, because what is one to do in the case of sick cattle eating nothing, who are now solely fed on milk? Whey is also said to contain these organisms.

"In another part of the country, friends tell me that the practice of vaccinating heifers has recently revolutionised the dairying in those parts. I should like to ask in a fairly clean herd whether they should be vaccinated as a matter of safety. Another point is that a short time before abortion the agglutination test is not always positive. Professor Edwards says that the agglutination test is amazingly correct on the whole, but I have had a case where one has not altogether been satisfied, and I should like to ask whether in view of what Professor Edwards says in his paper, a test may be necessary in two or three weeks. Will Professor Edwards say definitely that the second test is absolutely correct, and that a third might not be required?

"It is certainly gratifying to know that the bull cannot be regarded very seriously in this matter.

"With regard to the later note about teaching the farmer, it appears to be intended that the veterinary practitioner must become something of a missionary, and the difficulties that arise in this direction are considerable. It is all very well to tell them, but what they say is they haven't time or patience, and therefore in teaching them it is a very difficult matter to deal with. The only thing is whether the new legislation can open their eyes; the new order seems to leave it a great deal to the farmer. It is a very big matter to undertake, and it seems to me that complete notification and visitation by the police is necessary.

"Professor Edwards speaks very strongly as to isolation and disinfection. This is perhaps the most important thing. The farms are not large, buildings are inadequate, and we have no means of isolation on country farms. It is no use at this present time to ask landlords to assist us, as they won't even do ordinary repairs. He stated that some plan of treatment has been attempted simultaneously by the Royal Veterinary College and the Board of Agriculture, and I should like to know more about this. I thank Professor Edwards for his excellent paper."

Mr. H. TUDOR HUGHES, F.R.C.V.S., B.Sc., in continuing the discussion, said he felt honoured to be called upon to take part in the discussion on Professor Edwards' paper, as he had gone very deeply into the subject. "I should like to tender him my grateful thanks for all that he has done. It is a great step forward, and it ought to put the veterinary profession in possession of the facts published in respect to contagious abortion up to the end of 1920. There are of course two schools of thought relative to abortion, one Professor Edwards has very ably expounded, the other, which is in the main led by Professor Williams, of New York, regards contagious abortion as being non-specific. One would like to know whether any filtration experiments have been conducted, because the bacillus Bang is held to be able to pass from the body of one animal through the body of another one by means of its alimentary canal and blood stream. There you have a gross organism going through the body of an animal, and leaving no trace of its path. Again research appears to have been directed very largely to discovering one organism, and one only, namely, Bang's bacillus.

"I was particularly interested by Professor Edwards' remarks concerning the udder being the habitat of this bacillus. I was greatly struck in reading Poulsen's experience in a herd with contagious abortion. Poulsen undertook the removal of the afterbirth within 24 hours, and in six cases out of seven these animals proved in calf again, and there was no further trouble. What is the experience of cattle practitioners with regard to that? I should like to know whether the removal of the afterbirth should be performed early or late; in this country I think it is most frequent to leave the afterbirth two or three days. I am sure, also, we should welcome further details as to vaccination. With regard to Bang's experiments, one would like to know why there was not a uniformly disastrous termination to the experiments. It is explainable that the vaccine was at fault as regards purity or potency.

"A word about the bull, who now appears to be a very reformed character. It now occurs to one to ask whether the bull should under any circumstances whatever be inoculated with the living bacillus. I think it would clear the air if we were told whether the bull should be vaccinated. Again, with regard to vaccination, I think we should appreciate more detailed directions for dealing with the different classes of herds which we come across. The milk yield is a matter of secondary importance. There is the dairy herd that is run purely and simply for the yield of milk. It does not matter about the calf at all, so long as he is born to time, etc. In the farm herd I think you encounter the most unpromising conditions with regard to isolation."

Mr. E. H. CURBISHLEY, M.R.C.V.S., drew Professor Edwards' attention to a note in the paper to the effect that no appreciable beneficial or deleterious effects are noticed after vaccination, and asked whether this was due to the vaccination or to some other cause. He would also like Professor Edwards to say definitely whether he had ever received or heard of a death in an animal that had been vaccinated, and whether he had any ground for supposing that the vaccine may be blamed for the death, or whether it could be put down to any other cause.

Mr. T. C. FLETCHER, M.R.C.V.S., remarked that the questions that practitioners were particularly concerned in were those of advice to their clients. The paper formed a most interesting subject, and if Professor Edwards could do anything, or these gentlemen could help him to help them, he should be obliged. The only thing to do as far as he could see was to

introduce vaccination into any animals, whether they were aborting or not aborting, and to keep their bowels open.

Mr. F. L. Gooch, F.R.C.V.S., could not agree that 99 per cent. of outbreaks of abortion could be attributed to contagious abortion, as that left only 1 per cent. for shock, diseases, and all kinds of febrile disturbances. "I think there are many ways in which you can check contagious abortion, even if you cannot prevent its spread to other herds.

"I should like to ask Professor Edwards whether he has found that in carrying out the vaccination test certain breeds of animals have a greater immunity than others. I want to ask that question from a concrete motive. I have two herds that were treated in exactly the same manner. At the end of one year and nine months it was proved beyond doubt that the red poll herd was free. At the present time the other herd, a dairy shorthorn herd, is still affected.

"We are told later on in the paper that the principal thing we are to carry out is the agglutination test. Professor Edwards goes on to say that the hind-quarters are the ones most affected. Why should the hind-quarters of a cow and heifers that have calved be more frequently affected than the fore-quarters?

"With regard to the bull, I cannot agree with Professor Edwards from practical experience that the bull occupies a very small part in contagious abortion. In my opinion, in this particular herd in the case I have recorded, nearly all the contagion was carried by the bull. For three years we had the same bull, and during all that time, and although the vaccination test was carried out as soon as possible in prevention, we continually had fresh cases, not only in cows that had aborted once or twice, but in cows that had aborted three times. Immediately the bull was killed (the same animals were there) and the isolation and sanitation was carried out, the disease was reduced from at least 45 per cent. to 8 or 9 per cent. during the following two years. I should like to ask for an explanation from Professor Edwards with regard to this.

"As regards the conditions that arise in the uterus, I should like to ask Professor Edwards if these conditions prevail to a large extent after contagious abortion, because if so, how can we recognise the advice that Sir J. M'Fadyean has given us?

"Experience in this country indicates that cows do not abort at two successive pregnancies. In giving advice to our clients we want if we possibly can in introducing new animals into a herd to give this advice, 'buy non-pregnant animals,' the possibility being that they won't be affected, and by vaccination we shall be able to keep them free from contagious abortion. Pregnancy increases the capacity of the animal for developing contagious abortion.

"Can Professor Edwards explain how it is that in an animal that has twins we shall have one calf dead and either mummified or decomposed, and she will carry the other calf the full time and live? If 99 per cent. is due to the introduction of the Bang's bacillus, how is it that one calf lives and the other calf dies?

"I have come a long way to take part in this discussion, as I feel sure there is no paper that has given such interest to the ordinary practitioner."

Mr. H. G. Bowes, F.R.C.V.S., expressed his appreciation to Professor Edwards for the excellent paper. "I am not going to attempt to criticise it, but there are one or two points I would rather like Professor Edwards to illuminate a little further for my benefit, and one is as to how far we can rely on the agglutination test as a reliable guide. Professor Edwards regards it, as we all do, as a pretty reliable test, and there is no doubt that it is so; and the question that I have a suspicion about is, does the agglutination test safely indicate that the cow is at the present time affected, or that she has been affected at a certain time? The reason I have this doubt is, that one sees so many reactors that carry the calves the full time; but will that explain a case I have in mind in which a number of cattle have been tested at intervals, and yet 80 per cent. of the animals have not aborted? That rouses a doubt in my mind that the agglutination test may be positive for some indefinite period after an animal has recovered. He has also referred to the possibilities of heifer calves carrying the infection from time of birth until they conceive.

"I was very disappointed at Professor Edwards' remarks with regard to vaccination. If the vaccination had been a success in preventing abortion, then all we should need to do would be to vaccinate all heifers and any newly-calved animals that were brought into the herd.

"I should like to thank Professor Edwards for the very instructive paper he has presented to us."

Mr. F. E. Sampson, M.R.C.V.S.: "With regard to the bull it is very nice to hear what Professor Edwards says, which brings me back to a case in my experience in which a bull from a farm got mixed up with a neighbouring herd, resulting in the spread of contagious abortion.

"I was very interested in the paper."

Practical Isolation Difficulty.

Mr. T. Wilson, M.R.C.V.S.: "I think the Professor stated that vaccination is a potential form of spreading the disease. I should like him to explain how this is so. I myself had been hoping to hear that good results had been obtained from vaccination, and that in vaccination we had struck a cure. Personally I have done a lot of this vaccination, and with good results; the only bad results I have obtained have been with the older cows. A number of the farmers in my district have given up buying Irish cattle for the reason that they always aborted. I do not think I have had a single instance of one of these cows aborting after vaccination.

"If the farmers in my district are told that they will have to isolate their animals, they will not have the test carried out. I should like to know from Professor Edwards, is it necessary to inoculate a second

time? and also with regard to sterility, is there any connection between the two?"

Mr. G. MAYALL, M.R.C.V.S.: "I should just like to ask Professor Edwards whether this vaccination has any bad effects on cows that are suffering from latent tuberculosis, whether it has the effect of making them into screws? I have heard no one ask or suggest anything about the milk supply in this contagious abortion. Some years ago I think it was proved that there were a few cases of human abortion that followed the use of milk from aborted cows. I have not seen anything recently about it, but I feel sure that I have seen it mentioned as having occurred years ago. I think there is very little doubt that there is some evidence that the vaccination treatment is doing good. There is a gentleman I have in my mind who has for years reported results in the *Record*. For three or four years he has given statistics, and if you compare one year with another, you will find he is making very good progress."

Mr. LEYLAND, M.R.C.V.S.: "I have tried on more than one occasion the Board of Agriculture treatment on herds, that is, by introducing it into young stock, plus every cow that has calved, my principle having been to attempt to render every animal on the farm a certain amount of immunity. I am quite convinced that we may go into this question as to how it occurs and all about it, but I believe that once you get it into a herd, I think the thing is to render all immune to it. As a result of my experience, you are able to give your client something definite to go on. Tell him you can give him a certain percentage of results. I have been able to state that I can give them 85 per cent. of good results, that is without reckoning the older cows, which I advise owners to get rid of."

Mr. H. BRASSEY-EDWARDS, M.R.C.V.S., Nairobi, Kenya Colony: "I did not come here with the idea of taking any part in the discussion. I would like to know under what control the vaccine is put up, as my experience has been that these products are apt to vary in strength. In my own case we always test every product. I would like to know also if there is any control test before it is issued for the use of veterinary surgeons."

Lieut.-Col. J. W. BRITTLEBANK, C.M.G., M.R.C.V.S.: "I rise with a good deal of pleasure to again thank Professor Edwards. I think as an epitome of the literature on contagious abortion it is the most valuable contribution which it has been my good fortune to read for a many years. I do not propose, with the questions which have been asked, to burden him with any more. I am particularly interested in the control of contagious abortion. In the general work of dealing with bovine tuberculosis, I have naturally seen a great deal of contagious abortion, and I have as a general rule found that in the case of herds, that as the eradication of tuberculosis progressed, so did the amount of abortion diminish; and this is no doubt due to the fact that newly purchased animals are in all cases segregated for some period—certainly not less than one month before admission to the herd proper. In this way no doubt a considerable amount of infection is intercepted.

"I find that one of the most disturbing sequelæ of abortion is sterility. I believe it is stated that such sterility is in no way connected with abortion, but I have certainly had cases where aborted cows, after a period of three months, when put to the bull are extremely difficult to get in calf. I have one case recently in a pure bred shorthorn herd, where 18 cows had aborted and only two of these cows held to the bull five months after abortion, and this to a young bull of proved capacity. This temporary sterility gradually disappeared, but it is a very serious matter in a herd of high value.

"I note in Professor Edwards' paper that he says calves are highly resistent to Bang's bacillus. Is it possible that calves fed upon the milk of aborted cows acquire immunity? Professor Edwards has no doubt come in contact with some shrewd stockowners who deliberately feed calves on the milk from infected cows and claim excellent results. I have seen this practised extensively, and although it has been quite impossible to obtain actual records, I have frequently been told that such animals do not abort when they later assume the duties of maternity.

"I cannot close without again thanking Professor Edwards for his extremely able paper and for coming personally to help us to discuss it. I further feel sure that Professor Edwards carries with him the good wishes of all those who had the pleasure of knowing him, and that we feel sure our loss will be India's gain." (Applause.)

REPLY.

Professor EDWARDS: "Mr. President and Gentlemen,—First of all I wish to thank you very kindly for the amount of attention you have paid to my paper, and the tone of your discussion tells me that you have spent quite a deal of time in reading it. I have taken some notes of your remarks, and if there are any points which I have taken down inaccurately, I should like you to check me.

Mr. T. Wilson states that in my paper I regard vaccination as a potential method of spreading the disease. That is so, because the only useful form of vaccination consists in inoculating animals with a live bacillus, and it is capable of excreting these bacilli with the milk. It may be capable of excreting them with the fæces also.

Mr. E. H. Curbishley criticises various remarks in the paper. First of all he makes certain observations on the remarks made with regard to the other forms of infectious abortion. He admits that about 90 per cent. roughly of outbreaks of abortion are due to Bang's bacillus, and that 10 per cent. are left unaccounted for. How are they to be detected? I doubt that there are 10 per cent. of outbreaks that can be attributed to other organisms except Bang's bacillus, and I am referring particularly to outbreaks. The committee referred to outbreaks, and not to isolated cases of abortion. Ninety-nine per cent,, all but an insignificant number of outbreaks, are due to Bang's bacillus. You may get isolated cases due

to a variety of causes, but as I said in the paper, the remarks made by the Epizootic Abortion Committee still remain substantially true, viz., that all but an insignificant proportion of outbreaks of contagious abortion are due to Bang's bacillus, and when you have eradicated Bang's bacillus, you have got rid of all contagious abortion, except a few forms due to insignificant causes.

Then Mr. Curbishley refers to the other diseases which occur concurrently with contagious abortion very often in a herd and very often in the same animal, and the next speaker—Mr. Tudor Hughes—also deals at great length with these conditions. I have had this question brought before me at previous branch meetings—why it is that I have insisted in the paper that one should be careful to separate contagious abortion from those other complicated conditions? The reason is this, you will never get rid of contagious abortion by treating complications. The connection between contagious abortion and certain of these complications I have endeavoured to explain in the paper. The Bang's bacillus is not an organism which leaves much trace of its effects in the uterus, but its effects would quickly disappear if it were not for the fact that other organisms creep in after it has had its way, and produce these secondary complications. Outbreaks have occurred in pigs, but they have been traced to infection in cows, the only reservoir in the disease being the cow. It is quite possible to infect sheep and other animals experimentally; the disease, however, does not occur in sheep. It is hard to say why; probably it is due to the seasonal pregnancy of sheep.

Mr. Curbishley also asks whether it would be a danger to give sick animals the milk of diseased animals. That is a very difficult question to answer. One would say, do not give healthy animals the milk of diseased animals. The milk of a cow which may have aborted years ago may still contain bacilli. Until something more definite is known on this point. I should certainly advise strongly not to feed adult cattle with infected milk unless it has been boiled.

Is whey a source of danger to pigs? Yes, for the same reason; and so might the cheese be, if the pigs ate cheese. One knows that Malta fever is spread to man by eating the cheese made from infected goat's milk.

The practice of vaccinating virgin heifers and empty beasts as a mode of protection has revolutionised dairying in certain parts. Yes, that is admitted. I do not wish to condemn vaccination. Vaccination is, as I said in the paper, a most useful weapon in our armoury in the fight against contagious abortion, but it should not be undertaken rashly. Vaccination is capable of accomplishing a tremendous lot of good in certain conditions, but it should not be attempted in otherwise clean herds. If you think there is no method of stopping the disease running its natural course through a herd, then by all means resort to vaccination at once, then continue to vaccinate until the disease has ceased. Vaccinate the animals yearly until the disease has disappeared, then vaccinate all incoming animals. Is it sufficient to vaccinate once only? In the ordinary way it is sufficient; but sometimes the animal aborts, and it is better to vaccinate a second time. A safe rule is that formulated by the Oxfordshire County Committee, namely, to vaccinate every year until abortion ceases.

He regards the agglutination test as not entirely satisfactory, because it may be negative a short time before the act of abortion; but all the same it must be considered not only satisfactory, but wonderful. In comparison with other tests it is remarkably reliable. If an animal reacts, you may be sure that it is infected, or has been infected; it may be that the bacilli have disappeared, but as far as one can see, if the bacilli disappear, then the agglutination test very soon becomes negative. But one can always get over this difficulty which sometimes presents itself by testing the animal again a fortnight or three weeks later. There are thus limitations to the test. After the animal has ingested the bacilli from the ground, the organisms make their way to the system, and sometimes they seem to be able to multiply so quickly that they cause the act of abortion to occur before the agglutinins act. If you are extremely suspicious, send your second sample of blood up for test in, say, three weeks.

The question of guarantee is a very difficult one, ordinarily a test of a single sample would be sufficient, but an extremely scrupulous and careful purchaser would insist on a second test, say three weeks after the first.

Source of Infection.

The bull is not regarded as a serious transmitter. No. Although it is not regarded as a serious transmitter, it must not be regarded as an innocent carrier. Wherever one goes to examine cases in which the bull is suspected of transmitting the disease, then one usually finds that there is some other method by means of which this transmission can be accounted for, but in the same way as the cow which has ceased to abort, but which still reacts, must be regarded as a carrier, so the bull which reacts must be regarded as a carrier of disease, so that if you want to keep a clean herd you should not keep in it an infected bull. All experiments so far have proved that the bull is not an infector, therefore the bull must play an extremely small part, and the serious factor is the aborting cow with her diseased placenta.

Mr. Curbishley states that a second vaccination makes it practically certain that the disease can be eradicated and abortion prevented. I think general experience will agree with him there.

With regard to the education of the stock owner, as to how far they should be educated upon this point is a very important question. I think this is one of the diseases upon which it would pay the practitioner to educate himself, because I can think of no condition that you would engage the favour of an intelligent owner more than this. Of course the awkward farmer would be utterly incapable of appreciating these several points, but with the intelligent owner, with a highly-priced stock, then the practitioner may

certainly achieve a great deal more by timely and continued advice for over a protracted period, and thus a herd may be kept clean; but a vaccinated animal is not a clean animal. A vaccinated animal is always a disease carrier, and there are cases on record in which animals vaccinated subcutaneously may carry the bacilli in their system for three years or more.

Now *re* the plan for isolation and disinfection. I quite realise that this is most difficult on the ordinary farmstead, on account of the inadequacy of the buildings and pasture accommodation; but if the stock owner were educated to such a degree that he would recognise every case of abortion as a specific case of this particular disease, then methods of isolation and segregation would not be costly. In considering the advisability of applying the ideal method, namely, the segregation method, one has to take into consideration various factors, the extent to which the disease is spread, and, secondly, the facilities for adequate isolation. In highly-priced herds this is worth insisting upon at great cost, but in certain herds, almost from the outset it is not worth while attempting isolation; for example, in dairy herds, in which cattle have been brought in continually to replace others sold. In the case of valuable herds, endeavour by all means to keep them clean by adopting segregation methods.

A Rival School Reference.

Mr. Tudor Hughes at the onset of his discussion brings up one very important matter, namely, the so-called schools of thought. Professor Williams has now, fortunately in some respects, retired from his chair at Cornell University. I quite realise and have known for a long time his views, and how he in particular has been prime instigator in spreading a lot of literature about America which has been voiced in the lay press here. These other conditions which he sized up so intimately may occur frequently in association with it, but they have nothing directly to do with it; they may be complications, and only too often they have nothing indirectly to do with it.

The non-pregnant uterus and the pregnant uterus are sterile; if not, they are diseased. There is hardly a more delicate organ in the body than the uterus. What seems to be a peculiarity is that the Bang's bacillus will not produce any manifest signs of disease in an animal, except in the uterus. Ordinarily the uterus is quite free from infection.

Mr. Hughes next deals with retention of the afterbirth. Retention of the afterbirth occurs very frequently with contagious abortion.

When should one advise vaccination? I should say when all other methods seem impracticable, then resort at once to vaccination. If it is impossible to check the disease at once by segregation or isolation, then resort at once to vaccination; the earlier it is attempted the better.

Now, should the bull be inoculated? No, never; it is not worth while, and there is no point in it. I cannot see that there is any point in inoculating the bull, because if you inoculate him, you are only making him a potential spreader; as it is, he is quite harmless.

Mr. Hughes refers to the methods of dealing with the different classes of herds. Pedigree herds by all means endeavour to keep clean by means of segregation and isolation. Their high-priced value makes this measure worth resorting to, and the price of the animal is enhanced by the fact that it is a clean animal, whereas it would be lessened if it were known to be a carrier. Then, secondly, the dairy herd. In a dairy herd that is dependent upon purchased cows, I am afraid that there is no other method of controlling this disease than systematic vaccination. Thirdly, the ordinary farm herd. It will depend upon circumstances. In the ordinary farm herd, if the disease is detected very early, it may be possible to eradicate the disease by isolation and segregation, and particularly so if there are facilities for isolation; but if the disease has been allowed to run its course for some time, then again in this particular disease there is no alternative but vaccination.

Is widespread vaccination likely to modify the policy of the future? and should vaccination be practised universally? No. There comes a point of course in the case of any disease where it becomes important to decide whether a universal plan of treatment may be employed, and the necessity of adopting such a plan would depend upon the severity of the disease, and the benefits to be derived by adopting the universal policy.

On what ground is it possible to calculate whether an animal has calved prematurely previous to vaccination? Is it possible to do so by means of the agglutination test? All you can tell by means of this test is whether the animal is infected or not. You cannot say how long the animal has been infected. I am afraid the only means of ascertaining that would be the owner's integrity.

Mr. Curbishley points to the general effects after vaccination. Well, as far as recorded evidence goes, the vaccination itself causes no effects on the general condition of the animal. Some very careful records kept, in particular by the Germans, upon vaccination failed to show any deleterious effects of vaccination on the system of the animal.

Mr. T. C. Fletcher asks some general questions with regard to advice to clients, which I think I have covered.

How long before the proper time of calving should the animal be regarded as an aborting animal? It depends upon the result of the agglutination test; if the agglutination test proves that she is infected, this proves that she is an aborting animal. We have at hand certain definite weapons; namely, first of all a correct method of diagnosis, secondly vaccination, and we know a great deal of precise fact in connection with the disease, *i.e.*, the mode of transmission and the carrier problem. These points have all been recently illustrated, and they throw much light on these diseases.

Mr. F. L. Gooch is rather vehement on the bull question, and still maintains that the bull is an im-

portant factor in the spread of the disease. I think if most of his cases were closely examined they would be liable to some other interpretation than transmission by the bull. It would also be found that the straying bull had very little to do with the transmission of the disease, and especially so in this case.

With regard to the drug treatment, I have dealt with that question in the paper, and the apparent validity of these results are entirely due to the fact that no controls were left in the tests. It is a strange disease, which tends to die out naturally, and if one adopts a form of treatment in a herd which has suffered losses from contagious abortion, and endeavours to establish comparisons as to the results before and after treatment, one arrives at quite fallacious conclusions. The disease is self-limiting. In estimating also the beneficial results said to have been obtained with the vaccination treatment, you have to be careful to apply that criterion in judging the results. Repeated abortions do occur in this country, but I think that will be your experience that most cows do not abort more than twice.

Mr. H. G. Bowes asks me how far the agglutination test can be accepted as a reliable guide. It is an absolutely reliable guide if the animal reacts to the test. How far immunity may possibly be due to continued infection? It seems that the animal is only immune while it still harbours the bacilli in its body, but the presence of the organism in the body does not necessarily lead to abortion.

Mr. T. Wilson contributes some extremely important practical observations which will be important contributions to our practical knowledge, and particularly as much as they corroborate in the field what one knows or anticipates in the laboratory. He finds that he gets extremely good results after vaccination of younger cattle, and only bad results from older cows. The common cause of outbreaks of sterility in herds is not Bang's bacillus. Outbreaks of sterility are known to occur in herds which have never been infected with contagious abortion.

Mr. G. Mayall asks whether vaccination has any bad effects on cows suffering from tuberculosis. It is difficult to see how vaccination can have any bad effect on a tuberculous organism, and there would probably be some other explanation for this in the herd of cattle he mentions. With regard to the possibility of infecting human beings, I have dealt with the available knowledge in the paper, and everything seems to point to the freedom from danger in this respect.

Mr. Leyland has tried preventative treatment of young stock, and he appears to have used a vaccine from another source. I would like to know precisely what this other vaccine consists of. Recorded observations of experiments on a large scale tend to show that inoculations by dead vaccines are of very little use.

Mr. Brassey-Edwards has kindly brought to our notice the procedure carried out in his country in regard to testing products before use.

I am very grateful to you for your kind attention to me and the patience with which you have listened. I should have been pleased to have stayed with you and have given you any information which I could, but, unfortunately, shortly I will be leaving the country, and I will not be able to meet you again; but I hope, however, that this will not be the last meeting of this branch, and that you will continue to meet often to discuss such problems as these, which are of such great moment to us as a profession. (Applause.)

Bacterial Food Poisoning.

Where Two Professions Meet.

By W. G. Savage, M.D., M.O.H. for the County of Somerset.

I do not propose to traverse the well-worn theme of diseases of animals communicable to man. Professor Hobday has recently made a valuable contribution, and far more authoritatively than I could hope to do upon this subject, and he has shown how numerous are the diseases common to man and animals.

I think, however, that the subject should serve us well as a matter for discussion, and nothing but good will result from a consideration of means to close up avenues of infection of diseases from animals to man.

To my mind the fact that the medical and veterinary professions largely do their work in watertight compartments is a source of weakness, and there are many conditions which are still obscure, and the importance of which we do not realise, because they touch on the work of the two professions and are neglected by both.

I trust that other speakers will deal with all phases of the subject, but I will illustrate my contention by a short account of bacterial food poisoning in man so far as it concerns diseases in animals. I do so for three reasons.

(1st) It illustrates very well the need for co-operation between medical men and veterinary surgeons.

(2nd) I have spent 18 years on and off investigating it, and prefer to talk about things I know something about.

(3rd) In connection with the Ministry of Health and the Medical Research Council I have just arranged to supervise further investigations on this and allied subjects which may extensively open up untilled ground, and for which I seek to invite your co-operation.

The facts in connection with this condition are unlikely to be familiar to you from the human standpoint, so I will briefly set them out.

From time to time, particularly in the hotter months of the year, groups of individuals—sometimes all members of one family, sometimes a much larger number and scattered widely—are severely ill with acute intestinal disturbance chiefly shown by abdominal pain, marked diarrhœa and vomiting, often with a temperature. Recovery usually results, but a good many deaths occur. The one thing binding them together is that they ate one article

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of food in common. The food eaten is usually some form of meat, particularly prepared meat such as brawn, meat pies, etc., but by no means invariably so, and there have been a number associated with milk and a few not associated in any way with animal food.

These outbreaks are usually spoken of as ptomaine poisoning, which is a misnomer, since they have nothing to do with ptomaines, and are not even associated with decomposing food. I wish to emphasise that in the vast majority of cases the food affected is not noticeably altered in either appearance, taste, or smell.

When bacteriologically investigated they are all found to be due to bacilli of the Salmonella group, a group which contains the bacillus of paratyphoid fever, and which is closely allied to the typhoid bacillus, but perfectly distinct. By very careful and special bacteriological methods it has been possible to differentiate the types found into four distinct strains, *B. paratyphorus B.*, *B. enteritidis*, *B. aertrycke*, and *B. suipestifer*, the two latter of which are possibly identical. The toxins of these organisms are markedly heat resisting, and therefore even adequately cooked food may give rise to symptoms from the toxins which have not been destroyed by cooking. Outbreaks when associated with canned meat are generally of this character, and are of rapid onset, and usually not fatal.

These outbreaks have nothing at all to do with decomposing or tainted food, and are examples of infections with bacteria, or their products, of a very definite type.

So far there is no difficulty or lacunæ in our knowledge. The difficulties arise when we attempt to give a clear history of the source of infection. How and where did the food become infected with these bacilli ?

The evidence from the actual outbreaks is unmistakable that in a considerable proportion of them the infection of the food with these specific bacilli was *subsequent* to slaughter. While I shall have occasion to point out that in a good many cases there is actual or presumptive evidence that the food was specifically infected because it came from a diseased animal, in a larger proportion of cases the infection must have been after the animal had been killed.

How did the food become infected with these food poisoning bacilli ? It has been widely suggested that ordinary fæcal contamination of the food was the cause. This implies that members of this group inhabit naturally the animal intestine. This has been shown not to be the case. Ordinary excretal contamination will not set up food poisoning, because the specific bacilli are not there in the excreta of healthy animals.

A small number of cases are due to infection from human beings infected with these bacilli, but a careful study of outbreaks shows that this can only account for a very few of them.

We are left with the hypothesis that the infection is derived from diseased animals in nearly all cases. In a minority of instances we know this is the case, because the incriminated food has been traced back and found to be derived from an animal infected with one of these food poisoning bacilli. In an outbreak which I investigated at Murrow, in Cambridgeshire, in 1908, the brawn which caused the illness amongst 18 people, with three deaths, was derived from a pig which suffered from an injury (probably an abscess) of the leg, so much so that the animal had to be taken to the slaughter-house in a cart. I isolated a *B. aertrycke* strain. In several milk outbreaks the infection was due to cows suffering from mastitis or a general infection associated with the presence of these food poisoning bacilli.

In certain cases the association with diseased animals is very definite, but to keep our facts in proportion it must be stated that in the majority of cases no such connection can be traced at all, and as I have already mentioned, in most of them the evidence is clear that we have to deal with the secondary infection of originally perfectly sound food. It is this extensive group of cases we have to elucidate, and my own view of their causation is that this secondary infection also results from contamination of the food with these bacilli derived from animals which were either at the time suffering from disease due to members of this group or were acting as carriers of these bacilli. It is interesting to note in how many diseases of animals these Salmonella group bacilli are found. In swine fever, while not the cause of the condition, they are frequently present. They occur in calves apparently as the cause of some cases of septicæmia and calf dysentery. In horses they have been found by many observers associated with outbreaks of abortion in mares, although they are not the common cause of this condition Rarely they are found in bovines in connection with enteritis in cows. They have caused a number of outbreaks in birds, *i.e.*, parrots, canaries, pigeons, and finches. They are a fairly common cause of disease in rats and mice, and to a lesser extent amongst other small rodents, causing widespread epidemics.

Where we lack information is in the relationship between these conditions and food poisoning outbreaks. I have investigated very many outbreaks, and what one finds in outbreak after outbreak is that the infecting bacillus is isolated and found to be a member of this Salmonella or food poisoning group, the association of the cases with a particular article of food, and this bacillus is perfectly clear, but that there is no available evidence as to *how* the bacillus got there. Where did it come from ? What were the paths of infection ? Until we can clear up these questions it is unlikely that we shall be able to prevent these deplorable outbreaks, which are by no means infrequent.

You will note that there are all sorts of possible connections. I will mention but two. A considerable proportion of the outbreaks are due to the consumption of pig in one form or another. Salmonella bacilli are very prevalent in swine fever cases, and cause a secondary infection. We do not know

where they originate in these animals, and therefore cannot say if they also cause infection in pigs which do not suffer from swine fever but recover. Such animals would be carriers of infection, and if, as so often is the case, these animals are killed in slaughter-houses where animals are also being cooled, the sound animals may be splashed or otherwise infected from the infected intestinal contents.

The other possibility is that infected rats, so frequent in slaughter-houses, may infect carcases and other food, and so lead to the specific contamination.

I have done a good deal of investigation along these and other lines with which I will not trouble you, but will merely remark that we are still largely in the stage of hypothesis as regards the exact channels of infection.

The whole subject is of great practical importance, and the Ministry of Health and the Medical Research Council have arranged with me to undertake a comprehensive investigation, they providing bacterio-ological and laboratory assistance. We have started work last month, and Mr. Bruce White, the bacteri-logist, is very busy now with the bacteriological investigation of several food poisoning outbreaks. We shall be very glad of the co-operation of the veterinary profession in this research. One of the points we want to elucidate is the extent to which obscure diseases in animals are associated with infections with members of this Salmonella group. We have reasons for thinking that some pyæmic and septicæmic conditions in cows and pigs may be associated with infections with these bacilli, also a few cases of enteritis in cows. We shall be very glad to examine bacteriologically material from such cases and investigate outbreaks. Outfits will be supplied on request.

We also want to study how far these bacilli survive in the carrier state in infected cases which have recovered. The whole question of the distribution and survival of these bacilli amongst animals needs careful investigation, for much of our information is discrepant, while in bulk it is very scanty.

I have selected this human condition of food poisoning as an excellent example of the close relation-ship between human and animal pathology. That there are so many lacunæ in our knowledge is, I believe, due to the fact that the solution lies in that "No man's land" which is neglected by both professions. Other illustrations could be given, although none so striking, showing the need for co-operation.

The effective control of the milk supply is one which concerns veterinary surgeons as well as the medical profession.

I have written this paper as a short introduction to a discussion on the association of human and animal diseases, and I hope because I have mainly confined myself to one condition that the wider conception will not be lost sight of, but will be generally discussed.

May I say, in conclusion, that I regard it as both a valuable and a very pleasant privilege to meet here and have the honour of opening a discussion upon this important subject.

Discussion.

Discussion on the paper was opened by Major-General Sir Layton Blenkinsop and Professor Hobday.

Sir Layton Blenkinsop said: "My first duty in opening the discussion is to congratulate your Association on having the great good fortune in securing so distinguished an authority as Dr. Savage to address you on a subject which is of the greatest interest to both the veterinary and medical pro-fessions. He has brought us face to face with certain problems connected with bacterial food poisoning in the solution of which we can assist, and he invites our co-operation. This is the manifestation of a spirit for which the veterinary profession has long been waiting, and I trust that our profession, and especially the members of this Association, will heartily enter into the scheme and justify the hopes which the invitation implies.

Dr. Savage has eliminated ptomaine poisoning resulting from the consumption of food which has undergone decomposition, and asked us to concentrate our attention on the far more difficult question of apparently healthy food producing disease when consumed. He has told us that this food may be derived from an animal in apparent health, or from one the subject of disease or injury. Dr. Savage, while not regarding the diseased animals with in-difference, lays greater stress on instances where the flesh from apparently healthy animals gives rise to a chain of symptoms in man, and informs us that the bulk of evidence points to the flesh in these cases having undergone some post-mortem change. Is it not possible that in some of these instances failure to recognise the departure from health in animals from which the flesh has been obtained has been due to lack of adequate and skilled inspection of these animals before and after slaughter by a veterinary inspector? I venture to suggest that closer co-operation between the veterinary and medical pro-fession in this matter of meat inspection might help to elucidate many of the cases which have appeared obscure to the medical profession. We veterinarians know only too well the temptation, especially to the poorer man, of saving himself from total loss by converting the still living, though perhaps moribund, animal into beef, mutton or pork. These cases would not be possible if animals destined for human food had to be slaughtered in public abattoirs, under efficient veterinary supervision.

We are especially invited to consider the question of the *post-mortem* infection of spparently healthy flesh, which we are told is due to the invasion of organisms of the Salmonella group and subsequent production of heat-resisting toxins. The *B. botulinus*, an aerobic saprophyte producing a powerful toxin in meat, and giving rise to a definite train of symptoms in man, is not referred to—probably because the toxin is readily dissipated by heat.

Dr. Savage has placed before us evidence that the post-mortem infection of food by organisms of the

Salmonella group is not due to ordinary fæcal contamination, as the intestines of healthy animals do not contain these organisms. On the other hand, organisms of this group are present in certain diseased animals and it is suggested that post-mortem contamination may occur from these sources within the precincts of the abattoir.

Up to now I have always understood that organisms of the Salmonella group produce toxins which only become highly toxic in cultures of considerable age and in a fluid medium. It is difficult to conceive such optimum conditions for toxic production obtaining in a short time (such as in a recently slaughtered carcase) or in a solid medium such as the flesh itself would afford.

We are broadening our recognition of the possibility of a bacteræmia existing during life without obvious symptoms. This, as seen in carriers, is already fully recognised in certain diseases in man and animals. I venture to suggest that the presence in the circulating blood of members of the Salmonella group (restrained from generalising during the life of the animal, and giving rise to no train of noticeable symptoms) would suffice on death to bring about a specific and intimate infection of the muscular tissue of the body (such as tends to occur after death in black-quarter, etc.), and such as would suffice to establish toxic symptoms in man. Specific infection of the carcase after death, and the proliferation at sub-normal temperature of this specific organism to such an extent as to render the solid muscular substance highly toxic in a comparatively short time, seems to suggest an actiological complex much more difficult of acceptance than the theory of infection *intra vitam*.

We are appealed to to supply material from diseased animals, especially from those exhibiting pyæmic and septicæmic conditions, and also from similar cases which recover. The position, gentlemen, is this—little further progress can be made until material which comes before you daily finds its way to the laboratory, and is subject to rigid scientific scrutiny, and I trust before this meeting separates we may have promises from several members to supply all that is required for the purpose of investigation.

I gather from Dr. Savage's paper that fresh meat is not so liable to produce food poisoning as prepared meat, such as brawn, meat pies, etc. May not this be due to meat from a doubtful source finding its way to the table in the shape of prepared food, in which case it is not probable that some pathological condition existed prior to slaughter. Unquestionably there is much to learn concerning the effect on human beings of the flesh of animals destroyed as the expression is "to save their lives."

Dr. Savage has endeavoured to extend the scope of his paper in order to include all diseases of animals communicable to man, and has touched upon the importance of the scientific control of the public milk supply. You are all probably aware of my opinion on this important question, as I have stated my views recently at several other meetings. There is only one point I would like to reiterate, and that is, whoever enters into a business to supply the public with food of any description becomes a public servant and lays himself open to Government regulations. He has no right to claim that he is a private individual, nor should he be allowed to injure the public health by placing disease-producing food on the public market.

Gentlemen, I hope you will allow me, one of the junior Fellows of your Society, to convey my sincere thanks to Dr. Savage for his paper, and that you will permit me to impress upon you the importance of our co-operation as a profession in all questions affecting the health of the public."

Professor HOBDAY said: Two things to-day appear to me to stand out prominently as having been selected with judgment. One is the choice of the essayist, and the other the selection of the title of the paper. The duties of the Medical Officer of Health of a county naturally bring him into relationship, where disease is concerned, with animals as well as man; and when he deals with the diseases of animals, he must, of necessity, come in contact with the veterinarian as being the expert to advise on these things. The value of collaboration between the two has not yet been fully realised in this country, and it is to the Continent that we have to go to get examples of a well-thought-out system whereby the medical man and the veterinary surgeon work side by side in laboratories and in the field. The absence of State or other pecuniary encouragement has always been a great block in the way of advancement of our young men, gifted in brains, tact and ability, but poor in pocket, and forced to make their first thought the earning of their daily bread. If we in the veterinary profession in Great Britain and Ireland could but have a fair chance in respect of bursary scholarships and other facilities for post-graduate study, such as are given to members of the medical profession, we could put up a show fully equal to that of other countries, whose State-aid system gives opportunities which we in England can only at present dream of. Much can be and has been, however, done by private effort, and loyal co-operation between the two professions in regard to the public health service can effect a great deal. Dr. Savage has recognised this, and the people of the county of Somerset are especially fortunate in the fact that they have in their Medical Officer of Health a man who has made sufficient study of the diseases of animals to recognise that they are of very great importance in relationship to man, and that to eradicate those of a contagious nature from the animals themselves requires skilled veterinary aid, the medical man attending to his patients and the veterinary man to his. In the very early part of his paper Dr. Savage gives it as his opinion that there is far too much of the watertight compartment system of working, and that this is a source of weakness in the investigation and eradication of disease. With this one cannot but emphatically agree, and it is for our individual selves to see that this is remedied, and that in the future there is more collaboration than there has been in the past. Meetings like this of to-day, where the members of the veterinary profession interchange views with members of the medical profession, must

tell for advancement of knowledge, for (as Dr. Savage says) "there are many conditions which are still obscure and the importance of which we do not realise, because they touch on the work of the two professions and are neglected by both." This is to a large extent true; but I do not think the medical profession realise what the veterinary profession is doing or has done, and I am sure that as a body—and, indeed, even in their highest ranks—they have no idea of what a help to them a closer union with veterinary medicine would mean. It is only here and there that one finds a medical man who displays even the most elementary knowledge of animal diseases, and yet when all is said and done, flesh is flesh (whether human or animal), and the study of "why" one type of animal becomes affected with a certain disease and other species of animal flesh escapes must set men thinking of the comparative aspect of things, and the "whys" and "wherefores" come under the heading of a section of "comparative medicine."

Dr. Savage mentions the fact that the Ministry of Health and the National Research Council have arranged for a special investigation to be made into these bacterial diseases, and in connection with that asks for the help of the members of the veterinary profession. I should like to ask him whether any member of the veterinary profession has been appointed to work officially on this research in conjunction with his medical colleagues. I can assure him that the veterinary knowledge, advice, and help of such a man would be of inestimable help in saving the time lost in side-tracking; but if he wants the subject attacked seriously he must not rely upon voluntary workers only, but get hold of a properly-trained veterinarian to give his whole time and thought to the animal side of the question. And, of course, for this a salary must be provided commensurate with his qualifications and experience. We have our post-graduate courses of special study and university graduation in the shape of the B.Sc. (now of three Universities—London, Edinburgh, and Liverpool), the Diplomas of Veterinary State Medicine, of the Royal College of Veterinary Surgeons, and of Victoria University, and the Diploma of Veterinary Hygiene of Liverpool University, none of which can be taken until the student has passed his four years of college curriculum and taken the qualifying Diploma of the Royal College of Veterinary Surgeons. Hundreds of our graduates now have one or other (and many two or more) of these post-graduate degrees, and would be willing to take positions of research such as Dr. Savage has outlined. They cannot, however, afford to "give" their help other than spasmodically, for the ultimate aim of all fathers and guardians of sons placed in the veterinary profession, as with the human medical side, is that the boy shall be able to support himself. The necessity of voluntary collaboration in diseases is admitted by Dr. Savage in his paper, and in this he is not by any means alone, as a glance at the medical press recently will testify. Let him then use his personal influence to make this position for a veterinary colleague on this and other official investigations, and we will find him plenty of suitable, capable and congenial colleagues. The questions of meat and milk are ones upon which we think, from our training, we are especially qualified to advise and collaborate upon. They are each especially apt illustrations of the ground upon which comparative medicine must tread, for in these, above all, we have the animal aspect and the human aspect to consider, each from their view of the respect we specialise. Dr. Savage instances illnesses in humans due to eating brawn or other pig flesh, which, he states definitely, is not due to the eating of decomposing food, and which he surmises to be due to some illness of the living pig at the time of slaughter. He instances an outbreak he investigated in Cambridgeshire in 1908, which he surmises that the pig from which the brawn was taken had an injury, probably an abscess, which necessitated its carriage to the slaughter-house in a cart. This indefinite diagnosis could have been cleared up at once had that pig been killed in Germany, France, or Denmark, or even in Scotland; in fact, in any country where the proper man is put in his proper place, viz., the veterinary inspector to control veterinary matters. Had that pig been killed under proper abattoir conditions, the question as to whether the bacillus *aertryche*, was in the abscess or in the flesh, or not prior to death, or whether it was an after infection, could have been settled by the veterinary expert at once. As it is now, it can only be an hypothesis, and therefore only a surmise which awaits confirmation. The question of the presence or absence of disease in the living animal and the flesh of the carcase must always remain within the province of the veterinarian to decide. He, by his training, is the man best qualified to judge, and it is absurd to argue otherwise. Why we in England, the country supposed to be the most hygienic and sanitary in the world, still permit our meat inspection to be carried out in such a slipshod manner passes comprehension. Even our Colonies are generations ahead of us in this respect, and we cannot hold a candle to our late enemy the Hun. As to its effect upon man, the host who eats it, the medical expert must come in here, for man is his patient, but the ground between the animal alive and the preparation of its flesh for food is common ground, and ground upon which they both must meet. In fact, it is the "comparative aspect," as such concerns both, or perhaps, like many things which are really "everybody's" business, it becomes neglected and becomes "nobody's" business. And, above all, where food of man is the subject we want certainty, not hypothesis. A further plea for the collaboration scheme—the medical man and the veterinarian—each whole-time men, and each adequately remunerated for his services, to work together for the State. The way, too, that meat is exposed to contamination during transport through the street and by rail in England is disgraceful and requires reform. If meat requires the collaboration of the two professions, how much more does milk?—a fluid which forms the most ideal carrier of certain well-known fatal disease germs, horrible diseases, too, and which, in addition, disseminates,

mixed up insidiously within itself. From tuberculosis alone death comes to over 10,000 children annually in Great Britain, and causes injured constitutions to millions of both human beings and animals. Yet this is largely preventible—only a question of finance and proper collaboration between the medical and veterinary professions. What other poison would be allowed to be disseminated in this way? If a shopkeeper sold one-thousandth part of death-dealing stuff which the dairymen fearlessly distributes broadcast, he would be within four walls within an hour of it being known. What other bacterial disease is there of greater importance to animals and man? None; and yet what are we doing to check it? The Cattle Tuberculosis Order was repealed during the war. Why is that not in force again? Here, from this meeting, we ought to send a resolution forward asking for its immediate re-insertion amongst the legal enactments of the land. Even Ireland is ahead of us, for it has been law again there since last April. Not only, too, with tuberculosis, but the increasing prevalence of mastitis and the difficulty of immediate detection makes this disease of dairy cows one of serious import when considering the pure milk question. In conclusion, I beg to most heartily thank Dr. Savage for having given us this practical and useful paper. It has given us much to think about, and will help greatly to pave the way for the closer co-operation between the two branches of a great profession, viz., the profession of medicine.

Mr. ADAMS asked Dr. Savage whether the cases of infection he had quoted originated in places where there had been meat inspection, or had they arisen generally where there had been no meat inspection.

Dr. SAVAGE: It is quite immaterial. It is equally one with the other.

Mr. ADAMS pointed out that sometimes when a farmer discovered an animal affected with mastitis he sent the animal to market without any criminal intention, and Mr. Adams suggested that as a line of investigation for Dr. Savage.

Mr. HOBBS thanked Dr. Savage for his paper, and continued: "I would like to quote an experience I have recently witnessed.

A client called me one day to see a dead cow in a field; he was afraid of anthrax. I found the cow lying on her left side; the udder and teats were dark red in colour.

I opened the udder with a knife, and a most putrid exudate was observed. I had no doubt that the animal had died from septicæmia.

I advised the owner to inspect the udders of other cows in the field, and in two days afterwards I again received an urgent call to see more cows affected like the last. Three cows were driven in from the field, and the mammary glands of the three cows were affected. I had to excise the teats and syringe with strong antiseptics.

The owner and myself were firmly of opinion that if prompt attention be not given the animals would die. However, they did not die, and I had reduced the temperatures to normal in about three days. I was asked if I would pass them as fit for food. I said, 'No.'

I am quite sure that these cows would find their way to the butcher and be consumed. Perhaps I have eaten a portion, yet I feel well.

As a local veterinary inspector of the Ministry of Agriculture I have observed frequently that the boar may infect every sow he serves with swine fever, yet remain perfectly healthy himself.

With respect to milk and cows, I do not think the medical profession attach sufficient importance to the carriers of contagion. To illustrate what I mean, a little time ago scarlet fever or measles broke out in a village. Of course, the milk and cows were suspected, but the village school was still open. After a conversation with a local farmer, the medical man decided to inspect the schools, and discovered a child that had regularly attended school but which showed typical local symptoms. The school was immediately closed and the epidemic soon abated.

I trust, gentlemen, that my few remarks will interest you."

Mr. R. W. HALL said: "As a meat inspector, the subject so kindly introduced by Dr. Savage is of great interest, especially as he states that a specific organism has been isolated as the cause in all cases of bacterial food poisoning. He also states the possibility of animals that are suffering from certain disease, and which have in their tissues the same organism, may be the cause of some cases of mysterious food poisoning, and mentions animals with abscesses, septic wounds and mammitis as being possible causes. As these diseases, especially abscesses in liver and abdominal cavity, septic fluids in uterus and mammites, are not infrequently found in animals after slaughter, I should like to ask Dr. Savage whether the carcase of the affected animal should be condemned. Dr. Savage states that most cases of food poisoning occur in summer, and after eating such food as brawn, sausages, etc. As these foods are well-cooked in the preparation, how is it if the animal tissue is responsible, that the organism is not destroyed? Dr. Savage also states that the organism has been isolated in rats and mice. Would it not be more probable tha the food was contaminated after the cooking, either by these vermin or by flies, which act as conveyors of the organism?"

The HON. SECRETARY said it was a frequent occurrence for him to find that animals in various stages of disease had been killed and dressed and sent to the butcher. It was remarkable to him that more people did not suffer from ptomaine poisoning. The way the food system was carried on to-day was a standing disgrace to the country.

Mr. W. S. STEVENS asked Dr. Savage whether the contaminated meat he spoke of when he examined it merely appeared healthy or was actually healthy. He had in mind meat belonging to an animal killed near the point of death, this meat being, apparently, at post-mortem examination by smell and look quite good, but was actually unsound. Only ante-mortem examination would have made it possible of detection in ordinary routine meat inspection. He (Mr. Stevens) spoke feelingly, as he himself had been a victim of ptomaine poisoning by a most excellent-looking veal and ham pie.

Mr. ST. BEL GOLLEDGE referred to the distribution of milk cans for the collection of milk being done in a very careless manner, and said in many cases the cans might be seen lying by the roadside with covers off. He suggested that contamination of milk was a probable sequence.

Mr. W. P. STAPLEFORTH said: "I should like to add my quota of thanks to Dr. Savage and my appreciation of his able exposition on bacterial food poisoning. The subject is an interesting one and common to both professions. It is by such gatherings as this, where we find collaboration, that progress and useful information will, in all probability, result. I think that one of the most common of factors contributing to food poisoning is the careless and slipshod methods we, in this country, have of handling and carrying food, and particularly meat. It is quite a common occurrence to see men handling meat in filthy smocks and replacing it in vans and other vehicles which are far from sanitary. This is especially noticeable at our ports and some of our larger meat markets, where foreign carcases are handled with little thought of cleanliness. One also frequently sees such meat lying about on station barrows and platforms for hours, when they can very easily be contaminated by those organisms responsible for food poisoning. Another factor of moment is the traffic in diseased animals which is allowed with impunity

by public health authorities. Every veterinary practitioner knows that there is in his district a certain dealer who seems to make a speciality of this class of animal, and as soon as the veterinary surgeon has pronounced the patient incurable, and has advised slaughter and burial, he (the cattle dealer) is approached with a view to sale, probably for a few pounds. I have a very strong suspicion that much of this class of meat, instead of being used for the making of useful bye-products and so-called cat's-meat, finds its way to the markets of canned meats, pies and sausages. A large proportion of such meat is, no doubt, quite harmless from the point of view of bacterial food poisoning, but much must be extensively invaded by pathogenic bacteria and simply saturated with their toxins. Until we have seen elimination of private slaughter-houses, where meat from unsound and unwholesome carcases may be hidden in butchers' and pork-dealers' sidelines, and until we have a uniform system of food inspection supervised by duly-qualified veterinary surgeons and strict legislation to prohibit the traffic in diseased animals, we shall have bacterial food poisoning undiminished."

Major F. J. TAYLOR said, in thanking the essayist for his extremely interesting paper to both professions, he would be glad to know that the legal restrictions upon the private preparation of cooked meats (known in the lower quarters of large towns as beef-a-la-mode) was of a more stringently inspected nature than before the war. He recalled an outbreak of glanders in a large city, where the attendants upon the animals, which were profusely discharging purulent material from the nostrils, when not engaged in cleansing away these discharges, were assisting in the manufacture of this cheap pressed beef, and there appeared to be no law which prevented the dissemination of pathogenic food of this kind in existence at the time when this incident occurred. He recalled the common ailment known as "guts" prevalent amongst both officers and men serving on the Eastern Fronts during the war, and said it had never been satisfactorily explained to him whether the cause of this distressing complaint was heat, sand, "bacterial bully," contaminated water, or flies. Perhaps all these factors combined forces, but would the essayist throw a little light on the bacterial factor? Milk as a pathogenic organism carrier was well known to both professions. The essayist in a recent paper stated that in his opinion mastitis in cows was not a great danger to the public, and the speaker was in agreement with this statement, as there were very few dairies which were free from mastitis in some form or other. The infected milk did not always find its way down the drain, but entered the milk can—of course, by accident—and curiously enough there were few outbreaks of septic poisoning which could be directly traced to the milk supply. The totally uninspected condition of many markets, cow-houses and cattle accounted for such diseases as tuberculosis, foot-and-mouth, contagious abortion, and a host of other diseases now out of control, and causing countless avoidable deaths in the human and animal population, with consequent enormous money loss, which proper legislation could entirely eradicate. He asked if Dr. Savage would express his opinion as to why dogs could eat meats, etc., in a very advanced state of putrefaction (and anthrax) without apparent ill-effects from bacterial food poisoning; also if the discharges from fœtal membranes and those of abortion entering the milk and being consumed reproduced organisms causing similar symptoms in the human being.

Mr. WATSON, Mr. CODRINGTON, Mr. BRAIN and other members also raised various points.

The PRESIDENT said he felt he was voicing the feelings of the meeting when he said they owed Dr. Savage a very deep debt of gratitude for giving them such an interesting and instructive paper, inasmuch as he had shown once more that there did exist a deep and wide morass between comparative and human medicine, so deep and so wide, in fact, that there was almost room for another profession to dig itself in. Dr. Savage was inclined to the belief that food for human consumption was more likely to be contaminated after death than during life. He (the President) was sorry to disagree with so eminent an authority. He maintained that a lot of animals they saw in general practice, apparently in excellent health, were really harbouring and housing pathogenic bacteria, and in taking blood to obtain serum for culture media purposes under the strictest sterile precautions, he was struck by the number of cases which proved to be "foul," the contaminating organisms belonging most commonly to the *Coli* group. His argument was these organisms were continually being ingested, and so long as the body protective balance was maintained, the circulation remained sterile, but should that standard at any time become lowered, they broke through, a vicious circle was established, and they overran the system, which became charged with bacteria and their toxins. Should such an animal break its leg or the owner decided to send it to the butcher, it was passed on for human food. Such food saturated, as it was, with pathogenic bacteria and their toxins, might possibly have some bearing on the hypothesis Dr. Savage had inculcated in his paper.

THE REPLY.

Dr. SAVAGE replied to the discussion, and said a suggestion had been made that if they had a better system of meat inspection the majority of infectious outbreaks would be prevented. He wished he could think so. He agreed that they wanted a better inspection of meat, but he did not agree that that would prevent a considerable portion of outbreaks. A big outbreak at Newcastle eight years ago was due to milk that was traced back to a cow suffering from mastitis, and in which the bacteria were actually found. There was the fact that the bacteria existed in that cow for a very considerable period. The animal was returned as apparently sound while still harbouring living and virulent bacteria. That was a possible way of infection, as the President had suggested. Professor Hobday had suggested the importance of veterinary assistance to medical men. He was preaching to the converted. He (Dr. Savage) thoroughly agreed with him. Professor Hobday also raised the point that paid veterinary assistance would be valuable, and he agreed, and he would use what weight and strength he possessed in favour of an all-time man who would be paid. It was an important development. At present they were only starting, and they would have to show the need of it, but when he could show that voluntary assistance was valuable he could push and say he wanted a veterinary man to carry out the work. He was a little disappointed they did not have rather more information with regard to questions like swine fever and how far bacteria might be carried, but really there was not much information available on the subject. One member had raised the question of milking machines, and suggested the medical profession favoured them, but he (Dr. Savage) did not think they did. He did not. In conclusion, Dr. Savage said he appreciated the remarks made. He had learned a great deal from different points of view. He was sure if they could meet more often and he could gain their opinions as they could get his, it would be a benefit, and they would make a great deal of progress upon lines upon which they were now stationary. (Applause.)

The Veterinary Record.

29th October, 1921.

COUNCIL MEETING OF THE R.C.V.S.

In our last issue we commented upon some of the business transacted at the October quarterly meeting of the Council of the R.C.V.S., but lack of space made it impossible to emphasise all the features of a highly-important meeting. We wish to return to the subject in connection with one of the items on the agenda. By a resolution that may have very far-reaching results, the Council determined to appoint a Committee to consider the educational curriculum, and, if necessary, to suggest revision of the bye-laws dealing therewith. In his speech introducing the discussion, Mr. Trevor Spencer let fall certain observations that have doubtless been received by our various readers variously. When he animadverted on the tendency, which seems to be growing, to discuss matters of professional politics in the lay press, we do not doubt that he was putting into words the feelings of many members of the profession. At the same time, he apparently fully realised that the lay press is the *public* press, and that, therefore, writers therein—be they lay or professional—hold themselves justified in dealing with any subject whatsoever that touches the public interest. But when a section of the public press has not shown itself any too friendly towards the profession, and especially when a newspaper of premier standing has displayed ignorance—apparently ineradicable—of the true government of the profession, blame can scarcely attach to those who hold that the best interests of the profession—and therefore of the public—are not served by the discussion of professional high politics in the morning news-sheet. Though important nationally, the veterinary profession is so small numerically that there is some justification for those who hold it to be inadvisable for its members to forge thunderbolts for the journalistic Jove.

This part of Mr. Trevor Spencer's speech, however, was not of anything like the importance of the rest. His friendly criticism of the schools, we do not doubt, has been read with interest. We hold no brief for the defence of the schools—which are quite capable of conducting their own case—but we are persuaded that the practitioner of standing is in some danger of forgetting that the schools have never claimed that they produce finished veterinary surgeons. Someone—we forget who—somewhere—we do not remember in what place or on what occasion—said that the aim of the schools was to lay so solid and sound a foundation that, on passing his Final Examination, the student may be so equipped as to be capable of making himself a veterinary surgeon. And we have been surprised, more than once, by the high standard of professional skill that the practitioner expects of the newly-fledged graduate.

In connection with Mr. Spencer's plea for a year on a farm, we have been told that at some of the veterinary schools, and possibly at all of them, the authorities advise their students to spend their earlier long vacations in this manner. If this is so, it is obvious that the schools have already anticipated, in a measure, one of the educational reforms that are apparently held by the practitioner to be necessary. It seems quite possible that were the methods of the schools generally known, there would be fewer divergences of opinion; but on this point we are not in a position to speak with certainty, not knowing how fully the critics have informed themselves of conditions actually existing.

We have no wish, at this stage, to discuss what should and what should not be altered in the professional curriculum and the bye-laws relating thereto; but we are convinced that the Council have taken a wise step in determining to make a thorough investigation of the matter; and this if for no other reason than that, had they decided otherwise, they would have placed a powerful weapon in the hands of their critics.

Royal College of Veterinary Surgeons.

DIPLOMA IN VETERINARY STATE MEDICINE.

REGULATIONS.

1. Candidates for the Diploma in Veterinary State Medicine must present Certificates:

(*i*) That after obtaining Membership of the Royal College of Veterinary Surgeons, they have during five months received instruction in the following subjects at an affiliated School:—

(*a*) Epizootiology.

(*b*) Veterinary Bacteriology and Protozoology.

(*c*) Veterinary Hygiene and Toxicology.

(*ii*) That during a period of six months (of which three months shall be distinct and separate from the period of Laboratory instruction required under Sub-Section (*i*)) they have been diligently engaged in acquiring a knowledge of the duties of Veterinary Inspection in the administration of a State Department, County Council, Municipality or Urban Authority, employing one or more whole-time Veterinary Officers.*

* This requirement may be modified by the Council in the case of Veterinary Inspectors who have held an appointment recognised by the Council for not less than one year.

2. The examination will be held annually in the month of June at a centre (or centres) of Veterinary teaching to be decided by the President.

3. Applications must be received at least 28 days before the date of the Examination, and must be accompanied by a fee of £5 5s. 0d. In case of rejection at any examination, the fee for re-examination will be £3 3s. 0d.

4. Candidates will be examined both in written and oral (including practical) examinations in the following subjects :—

(*a*) Epizootiology.
(*b*) Veterinary Bacteriology and Protozoology.
(*c*) Veterinary Hygiene, including Meat and Dairy Inspection, Administration and reporting, and Toxicology.

5. There shall be two examiners, one internal and one external, for each subject of the examination, who shall receive such fees and expenses as shall from time to time be fixed by the Council.

6. It shall be left to the discretion of the Examiners to decide whether before presenting themselves for re-examination rejected candidates shall be required to attend a further course of instruction as set out in Section 1 (*i*) or (*ii*) of the regulations or both.

7. A student who has satisfied the Examiners in Parts (*a*), (*b*), or (*c*) of the Examination shall be exempted from re-examination in the section in which he has passed.

8. Written Examination. In each of the three subjects eight questions will be set. Three hours will be allowed for each paper, and 50 per cent. of marks will be necessary for a pass.

9. Oral Examination. The duration of the examination shall be left to the discretion of the Examiners.

10. Practical Examination.

(*b*) Veterinary Bacteriology and Protozoology. Duration of the Examination four hours.†

(*c*) Veterinary Hygiene. Meat Inspection, Dairy Inspection, Administration and Reporting. Duration of the Examination four hours.†

SYLLABUS.

(*a*) Epizootiology.

The etiology, modes of infection and dissemination, symptoms, diagnosis, and control or prevention of the diseases dealt with under the Diseases of Animals Acts and the Orders made thereunder. Candidates will also be expected to know the principal facts in the history of epizootic diseases in the United Kingdom, and the provisions of those Acts and Orders which deal with them.

(*b*) Veterinary Bacteriology and Protozoology.

The life history and characters of the Bacteria and Protozoa responsible for diseases of domesticated animals in the United Kingdom, and the characters of the lesions which they produce. The application of bacteriological methods in the diagnosis of these diseases. The principles of immunity, of vaccination, and of protective inoculation, and their particular application to the contagious and infectious diseases of the domesticated animals.

(*c*) Veterinary Hygiene and Toxicology.

The general principles of hygiene and their particular application to the provision of air, water, food, light, and housing accommodation for the different species of farm animals in a state of health.

The parasitic and micro-parasitic diseases of animals communicable to man and the methods of preventing such transmission.

Meat Inspection. Inspection of markets and slaughter-houses. The inspection of animals before and after slaughter. The general principles to be applied in the inspection of meat, and their particular application to the abnormalities commonly encountered in animals slaughtered for human food. Meat preservation, methods and results. The etiology of meat poisoning in man. Falsification and substitution of meat and meat products, and the means by which they may be detected. The laws affecting the sale of meat intended for the food of man. The disposal of offal and refuse.

Dairy Inspection. The sanitary production and distribution of milk. The inspection of cows, cowsheds, and dairies. Milk as a cause or vehicle of infection in man. Methods and standards of milk examination. The provisions of Orders and Regulations dealing with Dairies, Cowsheds, and Milk Shops.

Toxicology. Common organic and inorganic poisons, including poisonous plants. Symptoms and lesions. Recognition of the common poisonous plants and seeds.

Feeding Stuffs. General principles of feeding. Foods : varieties, recognition, quantities, adulteration and preparation. Deterioration of food, causes and effects.

Transport of Animals. Rail, road, and water transport. Construction and ventilation of Vehicles. Cleansing. Feeding and watering.

Reporting. The drafting of reports on the above subjects.

Royal College of Veterinary Surgeons,
10 Red Lion Square, London, W.C.1.
October, 1921.

† This may be varied at the discretion of the Examiners.

Royal College of Veterinary Surgeons.

A special meeting of Council was held at the College, 10 Red Lion Square, on Tuesday, October 18th, at 10 a.m., when there were present :—Sir Stewart Stockman, Vice-President (in the chair); Major-General Sir Layton Blenkinsop, Major J. W. Brittlebank, Messrs. J. B. Buxton, W. S. King, J. W. McIntosh, W. J. Mulvey, P. J. Simpson, T. F. Spencer, S. Slocock and J. Willett.

The Secretary announced that apologies for absence had been received from the President (Dr. O. Charnock Bradley), Major Abson, Mr. Gofton and Mr. Price.

Minutes.—The minutes of the previous meeting were read and confirmed.

D. V.S.M. Regulations.—The Vice-President moved from the chair that the revised regulations for the

Diploma in Veterinary State Medicine, which had been passed at the previous special meeting of Council, be confirmed. Mr. Mulvey seconded, and the resolution was carried unanimously.

The Vice-President then moved that the seal of the College be attached to the Bye-laws as revised, which was carried unanimously.

This concluded the business of the meeting.

Farewell Dinner to Capt. Edwards.

A representative company of well-wishers gathered at the Holborn Restaurant on October 12th, on the occasion of the farewell dinner to Capt. F. G. Edwards, B.Sc., M.R.C.V.S., preparatory to his imminent departure for India to take up the position of Imperial Bacteriologist at Muktesar.

The function followed upon a meeting of the Southern Branch of the N.V.M.A.

Lieut.-Col. T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M., occupied the chair, and there were also present, in addition to the guest of the evening, Major F. G. Hobday, Professors J. Macqueen, E. B. Reynolds and G. W. Wooldridge, Messrs. S. C. J. Bennett, T. J. Bosworth, Esmond Brown, J. Carless, H. Cooper, R. E. Glover, B. Gorton, H. P. Hogben, N. E. Hornby, E. G. Langford, H. A. MacCormack, J. W. Macintosh, G. P. Male, C. A. Powell, A. L. Sheather, Norman Thompson, F. W. Willett, and J. Willett.

The loyal toasts having been honoured following an excellent repast,

The CHAIRMAN submitted the guest of the evening. Having made felicitous reference to the many incidents of note and merit and Capt. Edwards's career, Col. Young read a letter which had been received from Major-Gen. Sir John Moore, regretting his inability to attend and emphasising the value of Capt. Edwards's past services to the army and their regret at losing him.

Their guest, continued Col. Young, was a Mons hero, and was going out to bring into play these same qualities of grit and resourcefulness in his endeavour to successfully carry throught the difficult task of scientific investigation at Muktesar. Capt. Edwards had a fine opportunity there to still further distinguish himself, and he had no doubt that full advantage would be taken of it, and that their guest would fill his new position with distinction. (Applause.)

Professor MACQUEEN, in the course of a dryly humorous speech, said that the gentleman for whom they had assembled to do honour was not very noticeable in his (the speaker's) class, doubtless for the reason that he was such an industrious student. Moreover, as a student, Capt. Edwards lived opposite to him, and he could tell how hard he worked by the time the light in his room went out, not that he was often awake to see that. (Laughter.) General Moore's remarks about Muktesar had induced in them the belief that is was a heavenly place, and certainly their guest was to be congratulated upon being transferred to heaven after having tasted hell at Mons. (Laughter.) He wished Captain Edwards the very best of good fortune in his new venture. (Applause.)

Major HOBDAY followed with a few laudatory remarks made "from an examiner's point of view."

Professor WOOLDRIDGE spoke convincingly, and, amid laughter, to the effect that when two Scotsmen, Prof. Macqueen and Col. Young, united in praise of one hailing from another country, that man must be thoroughly deserving of all the laudatory things that had been said of him.

Mr. MACINTOSH, representing the editorial committee of the *Veterinary Record*, spoke enthusiastically of the earnest and whole-hearted efforts made by Capt. Edwards on behalf of the paper at a very difficult time.

Prof. REYNOLDS reminded the company that he had been a fellow student of Capt. Edwards. He was not in it with him as a student. (Laughter.) During that time, and since those student days, the latter had been one of his best friends. (Applause.)

Mr. SHEATHER responded to the Chairman's call by giving an interesting account of life in the district to which Capt. Edwards is going, and which he himself has recently left. The speaker emphasised not only the opportunity for work afforded, but the necessity for taking advantage for health's sake of the fine sporting facilities provided.

The CHAIRMAN then submitted the toast of Capt. Edwards. This was drunk with enthusiasm, and the recipient accorded musical honours.

Capt. EDWARDS suitably acknowledged the honour done him by the holding of the dinner, and expressed his great gratification at being able to take away with him the memory of the kind words and wishes of those present.

The CHAIRMAN then drew the attention of the company to the fact that amongst them were two young men of promise, Messrs. Bennett and Cooper, who were accompanying Capt. Edwards to Muktesar. He was sure they would all join with him in wishing them also Godspeed. (Applause.)

Abstracts and Reviews.

A Contribution to our Knowledge of Sex Hormones.

In a previous work Dr. Fellner has shown that it is possible to prepare a lipoid from placenta, ova, corpora lutea and ovarian stroma, which when injected into the non-pregnant female causes marked development of the mammary glands and teats, together with enlargement of both uterus and vagina, and swelling of their mucous membrane. The same lipoid injected into a male likewise causes development of mammæ and teats, and no doubt it is this lipoid, or, rather, its contained hormone, which causes the development of secondary female characters in a castrated male, when an ovary is grafted into him. This action is specific for the substance in question, and cannot be obtained by the use of lipoids, like cholesterol or lecithin, or those

obtained from brain, liver or muscle. In this article the author gives details of further work along the same lines. He found that the injection of this placental-ovarian lipoid into the male, besides causing the development of secondary female characters, brought about atrophy of the testicles, due to degeneration of the cells of the tubules, not excluding those of Sertoli. A constant feature of this degeneration is the presence of giant-cells. On the other hand, there is hyperplasia of interstitial tissue. This action on the testis is not specific for the placental-ovarian lipoid, but can be brought about by the injection of other lipoids, as well as by X-ray irridation. Nevertheless, it is obvious that in the ovary there is produced a hormone which can be isolated with, or in the form of, a lipoid, the action of which is to cause development of female sexual characters and inhibition of male ones.

Dr. Fellner next isolated a lipoid from the normal testis and ascertained the effects of its injection into males and females. He discovered that he obtained exactly the same results as he got with the placental-ovarian lipoid, so that he was forced to form the conclusion that he was dealing with the same female sex hormone, although it was obtained from the testis. Since it is obvious that the exclusive task of the interstitial cells of the testis cannot be the manufacture of a hormone which brings about degeneration of the generative parts of the same organ, it is necessary and reasonable to postulate the existence of a stronger male hormone which normally inhibits the action of the lipoid, and which stimulates the development of male characters. Such a hormone, in fact, is known to be manufactured by the interstitial cells of the testis, but its isolation in the same way as the female hormone can be isolated in the form of a lipoid has not yet been brought about.

This work of Dr. Fellner thus supports the conclusions of those who hold that sex is the result of the *preponderance* of one of the two simultaneous and competing reactions which take place in all gonads, whether ovary or testis, the reactions being the production of the specific hormones of sexual differentiations. (In this connection see *Veterinary Record*, 1921, September 3rd, p. 707.)

[Uber die Wirkung des Placentar—und Hodenlipoids auf die männlichen und weiblichen Sexualorgane. By O. O. FELLNER. Pflügers Archiv fur die gesamte Physiologie. 1921. Vol. 189. No. 4/6. Pp. 199-214.]

H. E. H.

Comparison between the Various Ultra-Viruses of Neurotropic Affinity.

Levaditi (*C. R. Soc. Biologie*, July 23rd, 1921) gives a summary of the properties possessed in common by the ultra-viruses giving rise to encephalitis, herpes, rabies, poliomyelitis, and vaccinia. They may be grouped as follows: (1) They are all invisible filter-passers, they may all be preserved in the desiccated condition or in glycerin, they are destroyed at the same temperature, and *in vitro* they have only been cultivated in symbiosis with cellular elements. (2) They all have a distinct affinity for tissues derived from the embryonic ectoderm, such as the cornea, skin, and nervous system. For tissues developed from the mesoderm no special affinity is noticeable. The virus of vaccinia presents a constant affinity for the skin and the cornea and a variable affinity for the brain. The encephalitic virus may attack either the skin, the cornea, or the brain. The virus of rabies presents a special affinity for the brain, but can persist in the cornea or the skin. Finally, the virus of poliomyelitis offers no affinity for the skin or the cornea, but has a peculiar predisposition for the central nervous system, and more particularly for the grey matter of the spinal cord. In spite of the numerous properties which they possess in common, they each have a definite specificity of their own. The affections to which they give rise he proposes to call by the name of "ectodermoses." The skin and the spinal marrow stand at the two extremities of the scale of affinities manifested by these different viruses. It would appear that the greater affinity acquired by a particular virus for the skin the less apt does it become for attacking the central nervous system, and inversely. From this point of view vaccinia is the least neurotropic of the viruses studied, while the virus of poliomyelitis is the most exclusively neurotropic. Encephalitis and rabies occupy a middle position. One can easily grasp the analogy between this neurotropism and that of the *Treponema pallidum*. Here, also, the more the germ is deprived of its dermotropic affinity, the more easily does it become acclimatized to the brain (general paralysis) or to the spinal marrow (tabes dorsalis), and vice versa.

[*British Medical Journal*, No. 3170. October 1st, 1921.]

The Spread of Human Coccidiosis.

In 1915 H. M. Woodcock announced the discovery of a human coccidium in a man who had been invalided from Gallipoli. The discovery was quickly confirmed by G. C. Low and C. M. Wenyon, while the latter demonstrated that the coccidium belonged to the genus *Isospora*. Since that time a number of cases have been described from different parts of the world, and having encountered a case in the Philippines, Dr. F. G. Haughwout reviews the situation and shows that practically all the cases can be traced either directly or indirectly to the Eastern Mediterranean area and that this coccidium has now circumnavigated the globe. Such is the influence of the war in spreading infections. Infections in man who had been in the Eastern Mediterranean war area have been recorded in England, Italy, Egypt, Salonika, and America, while in India they have been noted in men returning from Mesopotamia. In all these cases it appears that the infection was contracted in Turkish territory. In America, however, C. A. Kofoid discovered infections not only in men who had been abroad, but also in others, so that it would seem that the infection may have been established in this country. A case recorded by F. Noc from West Africa was in a man who had been a prisoner of war in Germany, and the writer believes that the infection may have been contracted from other prisoners from the Eastern Mediterranean. The case seen by the writer in the Philippines was in a man who had come from the United States and who had never before been abroad, and it is concluded the infection was picked up there. The only cases which cannot even indirectly be connected with the war are two described by Porter in natives of South Africa. It remains to be seen whether the parasite which has been distributed about the world will now take a firm hold in distant countries with creation of new endemic centres. There appear to be four other coccidia of man, but they belong to the genus *Eimeria*, like the common coccidium of the rabbit, and are much more rarely met with than the *Isospora*. As regards the investigations recorded by the writer, he has little new information to add to what is already known. He has shown, however, that the oöcysts of *Isospora* can withstand exposure to a tropical sun for three hours, during which complete desiccation of the material in which they occur takes place. The oöcysts of coccidia are notoriously resistant structures and complete drying does not prevent the development

which must take place outside the body in order that they may bring about infection when swallowed by another human being.
[*Lancet*, Vol. CCI., No. 5118. October 1st, 1921.]

Clinical and Case Reports.

Pyæmic Nephritis.

By C. V. Dayus, M.R.C.V.S., Craven Arms, Shropshire.

Subject.—On October 22nd, about 10 a.m., I was called to see a five months' old colt foal, by a shire horse out of an old shire mare, a local prize-winner, and costing £26 a week previously. The owner told me the animal was all right and eating the night before, and was first noticed wrong about 7 a.m. the same morning. It had been weaned a week, and was housed and on good quality clover.

Symptoms.—On arrival I found the animal bordering on collapse, and in considerable pain. Temperature 106° F., very marked hyperpnœa, and mucous membranes distinctly pallid. It was dull, staggering, falling, and making violent struggles to rise again. Fæces normal, and on rectal examination the bladder was found empty. I naturally suspected congestion of some internal organ, but still the case was undiagnosed. The only thing to do was to administer stimulants, for it was obvious that the animal would not live long; in fact, it finally collapsed and died at 12 noon.

Autopsy.—It died in my presence, so I made a post-mortem at once. The first thing I noticed were the multitudes of petechial hæmorrhages into the visceral peritoneum, to a much lesser degree on the parietal portion. The whole of the mesenteric lymphatic glands hypertrophied and congested. One soon came to the root of the trouble in the enormously enlarged kidneys; when I took them out the left one weighed 3 lb. and the right one 3½ lb., both showing extensive infection with pyæmic nephritis. The liver weighed 15 lb., heart 7 lb., spleen 2½ lb., and lungs 10 lb. Peculiar, I thought, was the absence of any transudate into any of the serous cavities, owing to the large amount of congestion of all the organs.

One wonders, with such extensive morbid changes, that symptoms of a more chronic nature were not exhibited during life, and how one is to arrive at a definite diagnosis in the short period of five hours.

In this case there was no history of any antecedent suppurative lesion; or may it be the result of pre-natal infection?

Carcinoma (Encephaloid) in the Dog.

(By W. H. Brooke, M.R.C.V.S., Handsworth.)

(*Continued*).

The symptoms and treatment of this case, together with the lesions of the abdominal cavity disclosed on post-mortem, were given last week. The remainder of the report, proceeding with the post-mortem examination, is as follows:—

Thoracic cavity: On opening the thoracic cavity both lungs were seen to contain numerous growths, varying from the size of a millet seed to ¾in. in diameter. One was carcinomatous. All were of the same character, being greyish-white in colour, occasionally blood-streaked and soft in consistence. There was no trace of pus, caseous or calcareous material.

Microscopic examination showed the growths to be nearly wholly cellular. The cells were of large size, uncleated, and were sparsely interspersed with a faint stroma. I made four slides from various parts and all showed the same characteristics.

The dog, which belonged to a friend, I have known for nearly the whole of his life. He was a very healthy little animal until about three months ago, when he began to develop small soft pigmented skin-growths in various parts of his body.

Two, which were of rather large size, I removed, and he was, at the completion of the healing of his operation wounds, about five weeks prior to his last illness, very bright and in unusually good health.

Although I am not able to quote precedents definitely, I have noticed before that dogs which show these very common soft pigmented skin growths are occasionally affected with internal growths, and in making our diagnosis, if we have this external evidence we should certainly take it into account.

Suffocation of Pony by Reptile in Trachea.

By J. D. Stewart, B.V.Sc., M.R.C.V.S., Professor of Veterinary Science, The University of Sydney, N.S.W.

The following paragraph appeared in the *Stock and Station Journal* of 27th August, 1920:—

Snake in Pony's Nostril.

A trotting pony, owned by Mr. J. T. Mudd, of Oakhampton, Maitland, died a few days ago, after showing symptoms of illness. After its death an extraordinary discovery was made. A brown snake, which had somehow crawled up the pony's nostril, was found at the back of the nasal passage, and extending some distance down the throat. It is thought the snake took refuge in the pony's nostril while the latter was feeding in the paddock.

As the incident was somewhat extraordinary, I communicated with the owner to obtain further particulars and to ascertain whether the pony died of suffocation or from venom poisoning. He informed me that the pony showed great pain, breathed with difficulty, and when lying down fell as soon as the front legs were bent. He examined the internal organs after death and they appeared to be healthy. The snake (?) was about fifteen inches long, and was found in the back of the nasal passage and partly in the windpipe. He had never encountered the same species of snake before, it being brown, with two yellow stripes extending along the belly, and was of opinion that while the pony was

lying down asleep the snake had been disturbed by some other animal and took refuge in the pony's nostril. Evidently the snake passed in so quickly and got in so far that it could not be idslodged. Unfortunately, the snake could not be forwarded.

The zoologist of the Australian Museum was asked if he could identify the snake from the meagre description given. He informs me that identification is not possible, and suggests that the reptile might be one of the legless lizards.

The incident, from the above information, would appear to be a case of asphyxia from mechanical obstruction of the upper air passages by a reptile, and as such the occurrence may prove of interest to your readers.

Association Reports.

Mid-West and South Wales Veterinary Medical Association.

(*Continued.*)

Dr. W. G. Savage, M.D., M.O.H. for the county of Somerset, then read his paper on "Bacterial Food Poisons." The address will be found elsewhere in in this issue.

The members accorded a hearty vote of thanks to Dr. Savage for his paper.

Major TAYLOR, M.R.C.V.S. (Shaftesbury), moved the following resolution:—"That this meeting is of opinion the time has arrived when practical means should be sought to ensure a closer co-operation of the two professions in matters of common import, and that a copy of this resolution be forwarded to the R.C.P., R.C.S. and R.C.V.S."

In doing so Major Taylor said: "In proposing the resolution down to my name I should like to take the opportunity of saying how my own profession would welcome a closer co-operation between the two other professions. We have, after all, a common object, *i.e.*, the understanding of diseases, their relief and cure, both as applied to the animal man and the lower representative species. We are rapidly solving the problems of those diseases transmissible from one species to another. I think almost better headway will be made when we recognise that they are not so divergent from each other, and that we can only succeed by proceeding arm in arm through that previously almost unoccupied neutral territory which has been cleverly described as a No-Man's Land situated between two watertight compartments. It is hardly a correct description of our mutual relations, for there have been a few hardy snipers making their appearance occasionally, irrespective of the machine-gun fire of criticism from either compartments.

Personally, I have created an ideal in my own mind in hoping that at no distant date this "No-Man's Land" will be occupied by a Medical and Veterinary Research Institute of comparative pathology, State-aided, of course, on a rock of immovable foundation, and staffed by medical and veterinary experts working side by side with a great and common object in view. I would like also to see a combined publication issued weekly, or monthly, from such an institute. Perhaps our present comparative pathology journal would lend itself to such a scheme. That this profession wants a research department worthy of its practical needs there can be no question, and it should be unnecessary for individuals, and firms, to produce sera and vaccines for our use if we had an institution of this kind to depend upon.

There are many of the older heads of our profession who do not realise the progress their children extend and are making in the world of science. It is often difficult for a parent to grasp this fact as we all know in regard to our offsprings; but I am convinced there is a new life, and a wonderfully successful and progressive one, in store for all the junior ranks of our two professions if they will meet on a common parade-ground and realise that although our respective drills are nor identical, they both have their merits and the same ultimate object, and now the time has undoubtedly arrived for "combined training," and a permanent camp should be established without delay. If I may say on behalf of my profession (in which I have practised for nearly 25 years) that we gladly hold out the cordial hand of friendly co-operation, and assure the medical profession that it is our earnest hope they will allow us to work side by side for the furtherance of comparative knowledge, eradication, relief and cure of all animal species.

Meeting as we have done to-day, and thus having an opportunity for a combined free interchange of ideas, will do more to bring the professions together than perhaps any other influence; that we have a great deal to learn from our medical confrères we are only too ready to acknowledge, and I humbly suggest that we can make a fair exchange if there is a clear understanding what is required of us.

Dr. SAVAGE seconded the resolution.

The PRESIDENT read the following letter he had received from the Right Hon. Sir Clifford Allbutt, P.C., M.D., who, he said, was the G.O.M. of human medicine:—

ST. RADEGUNDS,
CAMBRIDGE,
July 8th, 1921.

Dear Mr. Scott,—I should have been very glad if my engagements had permitted me to attend your gathering; but I am otherwise fixed. Had I been able to attend I should have tried to propagate my cause—publicly urged since 1888—the cause of *Comparative Medicine*. The address you enclose to me contains on every page illustrations of the cross-lights which each branch of morbid biology would throw upon the rest. Many little points which to you seem of everyday interest are new to me, in this sense that they illuminate principles which in human medicine are less prominent. In your field they shine out with a new light, or appear in a new perspective. For instance, you can, with every kindliness and caution, act at your own discretion unhampered by

hesitations coming of the fears and reflections of more conscious creatures; and, moreover, you are concerned with lives of less value. Experiments of a light-bearing kind you may rightly undertake in the unreflecting animal in the hope of cure, which in man cannot be tried without very long periods of tentative proofs. In man we have often indeed to leave undone therapeutic means which a few years later have justified themselves by a riper experience; so that lives are lost for lack of confidence. But the large view of the matter is that disease pertains to the whole field of life—animals and plants; and that without the comparative method no science has flourished. We study biology as a whole—physiologically—but make not the slightest attempt to study life as a whole *pathologically*. There are many signs that this narrow point of view and work is coming to an end. You know how successful was the meeting of our doctors and the veterinary profession a few weeks ago at the Royal Society of Medicine. We do not desire to *fuse* your department of practice with ours—that is impossible; you must have your own portal and examinations and qualifications; but scientifically provision should be made for a comparative study of disease *in all life*. You have sketched out certain propositions to this effect which I agree with, and I shall be glad to hear that you have carried your Association with you.

In Cambridge we desire not to make a *clinical* school of veterinary medicine, but a school of research in animal and plant pathology, and also to lay ourselves out to teach the preliminary sciences to serve alike our profession and yours. As with the human medical pupils so the veterinarians would go up to London, etc., for practical classes and clinical work.—Yours very truly, CLIFFORD ALLBUTT.

After reading the letter the President said: Gentlemen, that is the letter of a man of vision.

The resolution was passed unanimously, and on the suggestion of Professor Hobday it was agreed to also forward a copy to the Royal Society of Medicine.

It was resolved to hold the next meeting of the Association at Cardiff on November 4th.

Mr. SYMES proposed a hearty vote of thanks to Mr. Scott for presiding and for his hospitality.

Sir LAYTON BLENKINSOP, in seconding, said their President had done enormous work for the veterinary profession and had helped it a great deal. He was doing a great deal towards bringing mutual co-operation between the veterinary profession and the medical profession.

The motion was passed with acclamation, and

The PRESIDENT said it was a great pleasure to him to entertain the Association.

After the meeting a garden party was held in the grounds of Friarn House, by the kind invitation of the President and Mrs. W. M. Scott.

On all hands members expressed themselves of having spent a most profitable and delightful day, well repaying the long distances many members had travelled to attend the meeting.

J. J. AVESTON, *Hon. Sec.*

Northern V.M.A.

A meeting of the Northern Branch of the National Association was held at 1-30 p.m., on Tuesday, October 4th, 1921, at the Grand Hotel, Aytoun Street, Manchester. The chair was taken by the President, W. A. Taylor, Esq., F.R.C.V.S., and the other members present were Messrs. J. Wolstenholme, E. H. Stent, J. W. Brittlebank, R. C. Locke, F. Hopkins, H. R. Oddy, T. Hopkin, J. Spruell (Manchester); R. Watts, A. W. Noel Pillers (Liverpool); J. Abson, J. S. Lloyd, S. E. Sampson, T. C. Fletcher (Sheffield); T. A. Dobie (Birkenhead); H. C. Bowes (Leeds); M. Robinson (Barnsley); E. Merriman (Bakewell); T. Wilson (Nantwich); F. L. Gooch (Stamford); H. Brassey-Edwards (Nairobi); H. Tudor Hughes (Oswestry); H. G. Hewetson (Southport); J. Holroyd (Blackburn); C. Wadsworth (Oldham); W. Hall (Royton); E. H. Curbishley (Alderley Edge); J. R. Rigby (Lytham); Professor Edwards (London); H. A. Leyland (Prescot); G. Mayall (Bolton); H. M. Holland (Keighley); and J. Whitehead (Salford).

Apologies for unavoidable absence were received from Professor O. C. Bradley and Messrs. H. T. Reynolds, W. H. Brooke, J. H. Dawes, G. H. Locke, J. Eaton Jones.

The notice convening the meeting was taken as read

SECRETARY'S REPORT.

This meeting is the first ordinary one of the Branch since the re-organisation of the National Veterinary Medical Association. The Council or General Purposes Committee, however, met as occasion required before the war. It is the feeling of the leaders of the National Veterinary Medical Association that such meetings should be more frequent, and so take the place of or rather extend the combined meetings which have recently occurred.

A fairly large amount of correspondence has been received, but most of it has also been sent to the divisions, each of which has taken individual action thereon. The remainder, purely of a non-contentious nature, has been dealt with after consultation with the President.

The number of divisions in the Branch is seven. Three of them are very active and flourishing, but in the remainder the membership is unfortunately small, considering the numerical strength of the profession in their areas. I am informed by the secretary that the Liverpool Division is defunct; the South Durham and North Yorkshire Division has joined the North of England, and so ceases to exist as a unit. The number of veterinary surgeons in the area of our branch is approximately 600, and when it is remembered that only about 406 are members of the Association, it will be seen that something is wanting to stir up professional *esprit de corps*. I feel it is up to all who can to help the secretaries of divisions with contributions for the success of their Societies. The Border Counties Society has not yet joined up, but we are still anxious that they should come in for, we hope, our mutual benefit.

The suspension of the *Veterinary Review* is to be regretted, and so is that of the *Veterinary News*, although, perhaps to a lesser degree; but we are extremely anxious that the *Veterinary Record* shall become a practitioner's organ, and occupy at least a share of every member's weekly reading. To attain this, clinical cases should be recorded, and one must not be upset even if, in response to editorial appeal, an article one may write never sees the light of day. Subscribers to the *Veterinary Record* are urgently needed for the benefit of all concerned.

The recent satisfactory resistance to a charge of cruelty brought by the R.S.P.C.A. against one of our members for a most trivial matter, viz., lice, should be a warning to all to join the Defence and Benevolent Society, which is, although unofficially, an essential point of this Association.

Election of a Branch Pathologist, Chemist, Botanist and Parasitologist.—This matter was brought up at the annual meeting at Chester, but it was thought proper that instead of the National Veterinary Medical Association doing it, the work should be done by the branches. The Secretary had been in communication with various gentlemen in Liverpool on this subject, and would suggest that the meeting leave the appointment of the four gentlemen in the hands of the President and Secretary, so that when the matter is fixed up, the names and addresses of the gentlemen appointed could be circulated to all members of the branch, with full particulars as to preserving and forwarding material, so that the same may be posted up in surgeries for reference.

Lieut.-Col. J. W. BRITTLEBANK, C.M.G., informed the meeting that he would like to accept everything that the Secretary had said, but make a provision that he himself be appointed Parasitologist to the Northern Branch. Personally he would just as soon have the Secretary's advice, and he would like to move that the Chemist, Botanist and Pathologist be appointed as proposed, but that Mr. Pillers be nominated as the Parasitologist. This was seconded by Mr. F. H. Stent, M.R.C.V.S., and carried unanimously.

The PRESIDENT informed the meeting that Professor J. T. Edwards, M.R.C.V.S., who has recently accepted an appointment in India, and who was leaving very shortly for that country, had honoured the branch with his presence, and was desirous of saying a few words in further reference to his paper, "Bovine Abortion and its Control," presented at the annual meeting of the National Veterinary Medical Association of Great Britain and Ireland Ltd., held at Chester, in July this year. He welcomed Professor Edwards on behalf of the meeting, as he was sure they would be pleased to see and hear him, and some of those present would hope to be here to see him come home again. (Applause.)

(A full report of the discussion on Captain Edwards' paper appears elsewhere in this issue.)

At the conclusion of the discussion on Capt. Edwards' paper Mr. J. B. WOLSTENHOLME, F.R.C.V.S., said: "May I be allowed to propose the best thanks of this meeting to Professor Edwards for his ecxellent paper. I think I have never read in the whole of my veterinary experience such an illuminating, such an interesting, and so clear a statement on a subject which is to many of us so ill-defined. I can only say that as far as my experience goes I have never read and studied anything with more pleasure than this paper which we have had before us to-day, coupled with which I never remember having listened with more interest."

Mr. G. MAYALL, M.R.C.V.S.: "I rise with some diffidence and yet with a great deal of pleasure to thank Professor Edwards for his very valuable paper. He has put before us a state of knowledge concerning this complaint right up to date. As years go by, no doubt, this meeting will be recalled, and will be remembered as a corner stone in the advance against contagious abortion in cattle. I can only wish Professor Edwards all success in the new sphere into which he goes."

Professor J. T. EDWARDS, M.R.C.V.S., in reply: "I have again to repeat my previous gratitude to you for your appreciation of my little effort and little contribution towards the advancement of our professional knowledge. Nothing gives one greater encouragement in one's efforts in this direction, and although a good many of you are now getting advanced in years, and your experience is far greater than ours, yet I hope to retain the friendship of the younger members and work in professional colloboration with them for many years to come. I thank you with all my heart for your sympathetic consideration."

Mr. T. C. FLETCHER, M.R.C.V.S.: "Will you allow me just as a visitor to thank you for allowing me to be present this day, and to pass a vote of thanks to the President for the manner in which he has conducted the meeting." This was seconded by Mr. S. E. SAMPSON.

A. W. NOEL PILLERS, *Hon. Secretary.*

The Central Veterinary Society.

The annual general meeting of the Society was held at 10 Red Lion Square, on Thursday, October 6th, 1921, Major-General Sir Layton J. Blenkinsop, K.C.B., D.S.O., President, in the chair.

The following Fellows signed the attendance book: Messrs. J. McCunn, H. J. Parkin, Major C. W. Dunkin, J. B. Buxton, R. J. Foreman, W. Norman Thompson, G. H. Livesey, J. W. McIntosh, J. Willett, W. R. Davis, A. E. Willett, Hamilton Kirk, Major P. W. Dayer Smith, R. C. Irving, Brevet Lieut-Colonel H. S. Mosley, Major W. S. Mulvey, Major F. T. G. Hobday, Major P. J. Simpson, W. Perryman, S. H. Slocock, E. L. Stroud, J. F. Macdonald, Professors G. H. Wooldridge and E. B. Reynolds, and Hugh A. MacCormack, Hon. Secretary.

Correspondence.—The SECRETARY announced letters regretting inability to be present from Major E. M. Perry, Captain Rees-Mogg and Mr. G. P. Male.

A letter was read from Mr. C. Cunningham resigning his position in the Society.

The SECRETARY reported that on receipt of the letter he wrote to Mr. Cunningham asking him to change his mind, but he had not had a reply yet.

The PRESIDENT reported that a number of replies had been received from the Honorary Fellows elected at the summer meeting, who were all very pleased and thanked the Society for their election.

Major HOBDAY said he had just returned from Italy, where he had seen Professor Dr. Antonini, of the Royal Veterinary School of Milan, and Dr. Cavallière Sacco, the Chief Veterinary Inspector for the Province of Cremona; each of them wished him to express their great pleasure for the honour which had been conferred.

The following candidates were balloted for and unanimously elected Fellows of the Society:—

Captain C. J. Macara-Finnie, M.A., M.R.C.V.S., 4 Vallance Road, Hove, Sussex; Captain S. E. Holmes, O.B.E., M.R.C.V.S., Veterinary Infirmary, Reigate, Surrey; Captain H. B. Collett, B.V.Sc., M.R.C.V.S., 81 South Hill Road, Hampstead, N.

Mr. E. LIONEL STROUD reported that he had received a resignation from Col. W. B. Edwards, of Falmouth, who was living so far away that he was not likely to be able to attend the meetings in future.

The resignation was accepted with regret.

ANNUAL REPORT.

The SECRETARY read the following annual report:

Mr. President and Gentlemen,—The Council is very pleased to announce that the Session 1919-20 is a great improvement on the last one, and we have now attained our pre-war standard. Twenty-two Fellows have been elected and four resigned. The following gentlemen have been elected Hon. Fellows of the Society, viz., Sir John Bland-Sutton and Sir D'Arcy Power (London); Sir Thomas Clifford Allbut, Cambridge University; Major Victor Drouin, Paris; Major Douville, Lyons; Lt.-Col. D. S. Tamblyn, Alberta, Canada; Frederick Torrence, Esq., Montreal, Canada; Dr. C. D. McGilvray, Toronto, Canada; Prof. W. L. Williams, Ithaco, W.S.A.; Prof. Dott Lanfranchi, Bologna, Italy; Dott Provido Secco, Cremona, Italy; Prof. Dott Antonini, Milano, Italy; Col. Meulmann, Bruxelles. All these gentlemen, as you are aware, are shining lights in the medical and veterinary professions.

The annual meeting took place in October, at which Mjaor-Gen. Sir L. J. Blenkinsop was unanimously elected president. Ten ordinary meetings and five council meetings have been held, with an average attendance of over forty-three at the ordinary meetings. The President gave his presidential address in March. In November we held our annual dinner, which was a marked success; one hundred and eleven sat down, many ladies being present.

The following papers were read: Capt. A. L. Wilson, "Notes on the Intra-dermal Palpebral Mallein Test for Glanders"; Capt. Ralph Bennett, "Notes on some Surgical Conditions of the Head and Neck of the Horse"; Mr. G. H. Livesey, "Some Observations on Canine Practice"; Mr. A. Duff-Dunbar, L.C.C., "A Note on my Experience in attempting to safeguard the London Milk Supply from Contamination with Tubercle Bacilli since 1908 and a Résumé of the eradication of Bovine Tuberculosis"; Major B. L. Lake, "A Few Notes on my Experience in North Russia."

Our June meeting was held at the Royal Army Veterinary Stores, Woolwich. After the routine business, we were conducted over the different departments and hospital, and saw much very interesting matter. The Fellows were entertained to tea and refreshments by the officers of the R.A.V.C. The Royal Society of Medicine, Wimpole Street, W., on February 3rd, invited the Fellows of your Society to be present at a meeting of their Society, when a paper was read by Prof. F. Hobday on "Observations of some of the Diseases of Animals Contagious to Man." We were again invited on March 14th to discuss "The Eradication of Tuberculosis in Man and Animals." Sir John M'Fadyean opened the discussion. This meeting was consequent on the one held in February. The papers delivered were very interesting and instructive, and we hope Fellows will come forward as readily in the coming session as they have done in the past.

We have to thank the following gentlemen for reporting cases and bringing forward post-mortem specimens:—Major B. L. Lake, Mr. S. H. Slocock. Lt.-Col. A. Olver related his American experience with regard to methods employed for faking horses.

Mr. J. B. Buxton read the report prepared by himself and Prof. G. H. Wooldridge as delegates of the Society to the R.S.I. Congress at Birmingham. Prof. Wooldridge and Mr. G. H. Livesey were nominated to attend the R.S.I. Congress at Folkestone. Unfortunately, Mr. Livesey could not attend, and Prof. Wooldridge will submit his report in due course.

Mr. J. W. McIntosh opened a discussion on "Appointment on the Board of Examiners of Members of the R.C.V.S.," also "The Standard of General Education required in Future before students can register at a Veterinary College." Mr. Livesey opened a discussion on "Teachers as Examiners." Resolutions were sent to the Royal College of Veterinary Surgeons.

Resolutions were received from the following Societies: Combined meeting of the Royal, Southern, and South-Eastern V.M.A., *re* "Proper System of Meat Inspection"; The Mid-West and South Wales Veterinary Society, *re* "Teachers as Examiners"; also resolutions from The National Clean Milk Society, which were discussed and forwarded to the N.V.A. for their consideration.

The Peace Medal for the Session 1918-19 was awarded to your Hon. Secretary, Mr. Hugh A. MacCormack, and the one for 1919-20 to Mr. F. T. Harvey, St. Columb.

The balance brought forward and receipts for the year was £174 5s. 8d.; the expenses were £125 14s. 11d.; leaving a balance of £48 10s. 9d., which we think very satisfactory.

Mr. MCINTOSH proposed that the annual report be received.

Mr. J. WILLETT seconded the motion, which was carried.

Professor WOOLDRIDGE proposed the adoption of the report.

The motion was seconded by Major SIMPSON, and carried unanimously.

On the proposition of Mr. DAVIS, seconded by Mr. THOMPSON, the balance sheet was also adopted.

Addition to Rules.—The PRESIDENT said it was proposed to add to the Rules the following:—"To include Trustees as *ex-officio* members of Council."

This was proposed at the last annual meeting, and was now brought forward for confirmation.

Mr. LIVESEY proposed that it be confirmed.

Mr. BUXTON seconded the motion, which was carried unanimously.

Award of Peace Medal.—The PRESIDENT said the Council at its last meeting had considered the awarding of the Peace Medal for the present year, and it was unanimously agreed that it should be awarded to Major Hobday for the work he had done for the Society in the past year. But it was not only during the past year that Major Hobday had helped the Society; he had worked for it for many years. The President was sure the Fellows would all agree that the choice of the Council had been a most happy one.

Major HOBDAY said he did not know how to thank the Fellows enough for the honour that had been

done to him. He only knew of it a few hours ago, and it came as an absolute surprise to him, and was most unexpected. Words failed him to say how much he appreciated the honour, and he could assure the Fellows that he had never had a more pleasant surprise in his life.

ELECTION OF OFFICERS.

The PRESIDENT said the next matter was the election of officers for the year, and he suggested that Mr. Hugh A. MacCormack and Mr. E. Lionel Stroud should be appointed scrutineers of the ballot.

The motion was carried unanimously.

Election of President.—The PRESIDENT said he had much pleasure in proposing from the chair the appointment of Mr. G. H. Livesey as President, and he did not think it was necessary to add a word in proposing it.

The motion was carried with acclamation.

Major-General Sir LAYTON J. BLENKINSOP then vacated the chair, which was taken, amid applause, by Mr. Livesey.

The PRESIDENT thanked the Fellows very much indeed for the honour they had conferred upon him in electing him their President for the ensuing year. He had a difficulty in taking the position after so well known and distinguished a Fellow as General Sir Layton Blenkinsop, and he felt great diffidence n following in Sir Layton's footsteps, and in those of others who had gone before him, but he would do his best and hoped he would give satisfaction during the year.

Election of Vice-Presidents.—The following gentlemen were elected as Vice-Presidents :—Major-General Sir Layton J. Blenkinsop, Mr. H. D. Jones, Mr. H. J. Parkin and Mr. W. N. Thompson.

Election of Council.—There was a large number of nominations for members of Council, and the ballot resulted in the election of the following :—Major P. J. Simpson, J. B. Buxton, Major F. Hobday, Professor G. H. Wooldridge, Major P. W. Dayer Smith, A. E. Willett, J. W. McIntosh, Major W. S. Mulvey, Professor E. B. Reynolds, Veterinary Captain G. Rees-Mogg, Major H. C. Dunkin and W. Perryman.

Election of Honorary Treasurer.—The PRESIDENT thought it would be impossible to do better than re-elect as Honorary Treasurer Mr. E. Lionel Stroud.

The motion was carried unanimously.

Mr. STROUD, in returning thanks, said he was getting a little old at the game, but it was not a very onerous duty.

Election of Honorary Secretary.—The PRESIDENT said he scarcely need name Mr. MacCormack for the office of Honorary Secretary, and it did not appear there could be any other nomination. Mr. MacCormack had been with the Society for so many years, and the Fellows appreciated his work so much in the past, that for the benefit of the Society alone they could not do better than continue him in the same office.

The motion was carried with acclamation.

The SECRETARY thanked the Fellows for the honour they had conferred upon him.

Election of Auditors and Trustees.—Mr. J. F. Macdonald and Major P. W. Dayer Smith were appointed Auditors, on the motion of Mr. J. WILLETT, seconded by Major SIMPSON.

Mr. FOREMAN proposed that the Trustees, Messrs. S. H. Slocock, J. Willett and E. L. Stroud, be re-elected.

Mr. BUXTON seconded the motion, which was carried unanimously.

Dinner Committee.—The following were elected as a Dinner Committee :—The President and Messrs. McIntosh, Willett and Wooldridge, with the Treasurer and Secretary.

(To be continued).

Notes and News

RECORD DAIRY SHOW.

As great a spectacle as ever, as useful and instructive as in the past, and even more attractive from several viewpoints than many of its late fore-runners, the forty-third London Dairy Show, held recently at Islington, must be written down as a complete success.

Never before in the history of the B.D.F.A. has there been such a collection of dairy cattle as was judged by inspection on the Wednesday. They made a most impressive display, and gave further evidence of the rapid strides breeders of dairy stock are making towards the evolution of a profitable, heavy yielding, big-bagged, symmetrical and stylish cow.

The Friesian once more won the chief honour for all-round merit and performance.

The establishment of milk-recording societies has been one of the greatest aids to the important movement for grading up our herds in the matter of milk yield. They have been the means of eradicating unprofitable animals from dairy herds, and it is now possible not only to purchase thoroughly reliable milking cows, which can be depended upon to give a good return for the food they consume. It is also easy to secure reliably bred milking sires from recorded cows which will perpetuate and further improve the milking qualities of the herd.

Our pedigree milking herds are steadily increasing in numbers and in quality, and as farmers now see the value of pedigree and the value of milk records, there can be no question about the future of high-class pedigree dairy cattle. The Dairy Show may be said to have focussed public attention on the new movement.

Erratum.—In the review under the heading *Italian Veterinary Annual*, October 22nd, 1921, page 856, column 1, line 15, the word "Zootiatry" should be "Zooiatry."

The eleventh International Horse Show will be held at Olympia next year, beginning on Saturday, June 17th, and ending on Saturday, June 24th. This is the week immediately following Ascot.

Mr. J. Q. Rowett paid 3,100 guineas for Sundridge Nulli Secundus at the Mond Sale.

After drinking overnight from a water-trough in High Road, Buckhurst Hill, two valuable horses belonging to a contractor were found to have died in their stalls, evidently in great pain.

Post-mortem examination disclosed that death was due to arsenical poisoning.

Other horses are reported to have suffered after drinking from the same trough. The police have the matter in hand.

Obituary.

MR. J. B. DUNLOP.

Mr. John Boyd Dunlop, a veterinary surgeon, whose name is familiar the world over as the inventor of the

pneumatic tyre, without which the modern bicycle and motor car would be all but impossible, died suddenly on Sunday night at his residence, Leighton, Ailesbury Road, Dublin, aged 81. He had been in failing health for some years.

His invention, says the *Times*, was made originally for the benefit of his young son John, who had a tricycle. The result of his experiment, however, was so immediately successful that a second-rate cyclist won all four races at Queen's College, Belfast, in May, 1889, and thus demonstrated that the pneumatic tyre was not only comfortable but speedy.

Aided by the late Mr. Harvey Du Cros, Mr. R. J. Mecredy, and a few other Dublin friends, a company was formed in November, 1889, for the exploitation of the tyre, with £25,000 nominal capital. The capital of successive companies covered many millions of money.

The pneumatic tyre is often supposed to be an Irish invention, but, in fact, Mr. Dunlop was a Scotsman by birth and education, for he was born at Dreghorn, in Ayrshire, on February 5th, 1840, and after attending Irvine Academy obtained his diploma as a veterinary surgeon in Edinburgh in 1859. He migrated to Belfast in 1867, where he became a highly successful veterinary surgeon. After he had patented his invention he established a rubber tyre factory in Lincoln Place, Dublin. The residents of Merrion Square, the adjoining residential area, raised an outcry on account of the fumes from the factory, whereupon Mr. Dunlop established works at Coventry, and the Lincoln Place premises were used as a distributing centre for Ireland.

Mr. Dunlop married a Belfast lady, who survives him. He had two sons, one of whom died 18 months ago, and a daughter.

Correspondence.

Letters to the Editors should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Duration of Certificate Liability.

Sirs,—I want a reply through your correspondence columns to the following question.

If a M.R.C.V.S. professionally examines a horse and passes same sound, and gives a certificate, how long does that certificate last as to the soundness of the horse, and when does liability end for the M.R.C.V.S. ?

This is a very important question, and I should like to be perfectly satisfied over it.—Yours faithfully, JOSEPH J. SCOTT.

11 St. John's Street, Colchester, October 19th, 1921.

Vaccine and Serum Therapy.

Sir,—The letter under the above heading in the current issue of the *Veterinary Record*, by M.R.C.V.S., is interesting and to some extent regrettable. Regrettable because it contains rather much of that which we have been frequently troubled with of late, viz., petty unfortunate attacks on somebody or something, instead of open statement and argument, and the letter would have carried more weight had the writer appended his name. The veterinary profession contains many men who fail to appreciate the full value of vaccine therapy, but in this it is not alone, for many eminent physicians and surgeons refuse to swallow all the extravagant claims made by enthusiastic immunologists, serologists, vaccinologists, or whatever names we may give them, regarding their results. The apparently brilliant successes are recorded; of the evident failures we are not told. A strikingly good result in vaccine therapy may at bottom have nothing to do with the vaccine treatment at all, and what otherwise appears to be a palpable failure may be explained on other grounds than the shortcomings of the vaccine itself. Thus it becomes necessary to stabilise our methods of reporting and inquiry, and all the facts should be placed. Enthusiasm and zeal are valuable and necessary to the therapeutist, but he should not run away from cool analysis of total results. One is here reminded of some words of Sir James Creighton Brown, F.R.S., in an address on education, delivered some years ago. He said "We should take a medium course between the Charybdis of a weak, pallid and negative punditism on the one hand, and the Scylla of a stupid, brawny, positive, and aggressive athleticism on the other." And so with vaccines and sera in veterinary medicine and surgery: let us be balanced if possible and not screamingly hysterical in pushing their claims.

Of the value of anti-tetanic serum as a preventative of tetanus I have no doubt, but I question much the German claims of its curative action, or value, as outlined by your correspondent, and moreover one had hoped that the old pre-war dodge of introducing, as proved conclusions, the acrobatic performances and bald statements of German therapeutists regarding their results had disappeared from veterinary literature.

I am in agreement with your correspondent regarding the fascination and vastness of the whole subject, and regret that more attention is not given to it in our teaching institutions; but do not let us run away with the idea that the teaching in our schools is necessarily antiquated, for this is also an old stunt. I know something of its scope and kind in at least two of our colleges, and I certainly cannot agree that as far as it goes it is in any way antiquated.

The teacher is told to-day that he has turned out a man unable to handle a horse or manœuvre a wild ox into position; to-morrow that he cannot prepare a vaccine and indicate the exact number of millions of organisms in a centimetre of a given culture; or that he knows very little of food inspection; and then the more humdrum of us think that he should have an outlook on disease, as it actually occurs, equal to most of us who have acquired our knowledge and experience after twenty or thirty years in practice. Truly, the lot of the teacher is no sinecure or a bed of roses. It appears to me, however, that there is something lacking in the methods of education of the modern veterinary student, and the fault lies not with the teacher so much as with the scope of our institutions. They attempt too much, as of old: everything is taught. A year might be added to the curriculum, by most of the early subjects being taught outside, and the men might then pass at once to the purely veterinary side of the work.

One college or school might be sufficient for all the first year men in the country and the expense all round would be infinitely less. The subsequent teaching might then be carried out by a purely veterinary staff at the centres selected. To the outsider there seems too much of the water-tight compartment feature in our veterinary schools at present in regard to the system of teaching. The latter should have more of the University and less of the ordinary school atmosphere about it, and more work should be done on the lines of the clinics of the Mayo Brothers, of Rochester, U.S.A. But great investigators, or research workers, are not necessarily the best student's men, as with the former, there is liable to be developed an atmosphere of aloofness which is often fatal to many a student. The humanities are all important in teaching, and the creation of a common bond of fellowship between teacher and taught is of the utmost value, both before and after qualification. Who amongst those in practice to-day, and who studied under William Robertson, but has a tender corner in his heart for the grand old man, who so late in life was transferred from his beloved hills and lowlands to the then drab interior of Camden Town ?

The note-book system of learning seems to have almost entirely superseded any form of general reading, either on medicine, surgery, hygiene, or parasitology, and this is, I think, somewhat unfortunate, for the student who does no reading up to the time of qualification quite rarely does any afterwards, and in a few years he finds it difficult

to follow, or keep, with the general advance. It is perhaps partly due to this practice that the complaint alluded to by your correspondent originates, viz., that our ultra-scientists "become subjected to the indignity of having to argue the value of an auto-vaccine in comparison with that of a seton." But is there any indignity in arguing the point? I think not. We do undoubtedly become the slaves of routine more or less, and herein lies the value of our associations, national and local, and also of our professional press, and I believe that the little support all of them receive at the hands of so many of the profession is partly due to the note-book vogue so much in evidence to-day in our teaching system; and I am quite in accord with the remarks of the reviewer of Professor Linton's book, as given in the *Record* on this question.

Then again as to research work, apart from that which is purely clinical, few of us realise the tremendous difficulties and responsibilities of this kind of work as it should be carried out to-day. It requires checking or testing by co-workers, or otherwise, at every stage, as without this gallery applause or results claimed avail nothing, lead to side-tracking of issues, and is wasted effort.

I have nothing but admiration for the work our friend Mr. Scott is trying to accomplish in the fields of vaccine therapy and immunology, but having a fairly good acquaintance with the literature of the subject, both human and veterinary, in this country, I have seen no results recorded at all comparable with the dramatic achievements claimed by him. Perhaps the heroic doses, etc., may explain the good results obtained, and the future of course will tell.

Let us stop petty and anonymous attacks on students, teachers, and the profession generally, and spend our extra energies on adding to the sum total of our knowledge of disease and its prevention, and to professional organisation, and thus benefit ourselves, the animal world, and the human race.

In reviewing a book some time since, the reviewer stated that the author had better have been sleeping than writing, and lest a similar charge may be levelled against myself, I may say that my excuse for writing is that I am waiting on muscle repair and at present have nothing better to do.

—Yours truly, F. T. HARVEY.

St. Columb, *October 17th*, 1921.

Army Veterinary Service.

LONDON GAZETTE.—WAR OFFICE—REGULAR FORCES.

October 14th.—Col. F. Eassie, C.B., C.M.G., D.S.O., having attained the age fixed for compulsory retirement, is placed on retired pay (October 15th), and is granted the hon. rank of Brig.-General.

R.A.V.C.—Lieut.-Col. F. W. Wilson, C.M.G., F.R.C.V.S., to be Colonel (October 15th); Temp. Capt. T. M. Parker, M.B.E., relinquishes his command on completion of service (September 1st), and retains the rank of Capt. (substituted for the notification in the *Gazette* of September 22nd).

October 21st.—The following Captains to be Majors:—Bt.-Major W. N. Rowston, V. C. Leckie, D.S.O. (September 5th); A. S. Lawrie (October 11th).

TERRITORIAL FORCE.

October 18th.—Captain W. Walker (late R.A.V.C.) to be Captain, prec. July 26th, 1916 (September 30th).

Captain T. J. C. Symes resigns his commission (October 19th), and retains rank of Captain.

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No	No.	No.	No.	No.	No.
Week ended 15th October, 1921	...	...	4	6	...	...	...	4	4	4	4	15	8
Corresponding Week in 1920	2	...	5	5	...	...	1	1	28	39	6	14	9
Corresponding Week in 1919	1	1	8	9	1	35	...	...	26	44	2	50	30
Corresponding Week in 1918	14	...	4	4	...	...	...	2	47	83	3	32	8
Total for 42 weeks, 1921 ...	22	1	398	514	43	2958	11	35	1837	2801	434	1008	363
Corresponding period in 1920	27	...	337	406	75	9784	11	18	3207	5300	328	1563	633
Corresponding period in 1919	144	4	170	221	29	1630	21	54	4255	8490	244	1853	867
Corresponding period in 1918	40	1	201	231	3	40	27	74	3676	6891	264	1153	456

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

IRELAND.									Outbreaks			
Week ended 15th October, 1921...	...	...	...	...	...	...	...	...	...	4	1	36
Corresponding Week in 1920 ...	...	...	...	...	...	...	...	...	2	12	...	2
Corresponding Week in 1919 ...	...	...	...	...	...	...	...	...	1	9	...	...
Corresponding Week in 1918 ...	...	...	...	...	...	...	...	...	...	8	...	...
Total for 42 weeks, 1921	1	1	7	77	...	...	70		221	92	524	
Corresponding period in 1920 ...	1	1	...	...	1	3	89		274	11	34	
Corresponding period in 1919 ...	...	...	...	...	1	1	129		208	30	92	
Corresponding period in 1918 ...	2	2	...	...	...	...	92		254	22	72	

NOTE.—The figures for the current year are approximate only.